Railway Age
AND RAILWAY REVIEW

FIRST HALF OF 1928—No. 26 JUNE 30, 1928 SEVENTY-THIRD YEAR

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Railway Age

Vol. 84 June 30, 1928 No. 26

On the Boston & Albany at Boston, Mass.

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Railway Age

Vol. 84, No. 26 *June 30, 1928*

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Shop Methods on the Track

IN the "good old days" on the track, those days which appear so much better through the golden haze of romance than they did when the laborer met them face to face, there was a current saying that much of the work could be lightened if it could be taken to the shops to be done by machinery. While this was a dream impossible of realization and popular only because of its absurdity, modern ingenuity has applied its talents to bringing the shop to the track and the scheduling of the machines in proper sequence is as much the duty of the maintenance engineer as is the routing of work for straight line production for those in charge of shop operations. The advance in the mechanization of track work is the one thing which has enabled the railways to improve their roadways so materially in the last few years in the face of an industrial activity which has absorbed all surplus labor and in spite of the stringent restriction of immigration. These two factors have been nullified to a great extent, so far as track work is concerned, by the various machines which reduce the number of men necessary; it is not too much to say that without them the railways could neither have secured the men to do the work that has been done nor the means to pay for it if the men had been available.

Steam Hammers and Flow Meters

VARIOUS means of reducing the cost of power for shops and yards have been suggested in recent issues of the *Railway Age*. These included the purchase of power, the building of new power plants and ways and means for improving existing plants. It is equally important to check the manner in which the power is used. An example of the value of this practice is provided by a recent investigation made on the Boston & Maine. A flow meter was placed in a steam line which carried high pressure steam for the operation of a steam hammer and a small engine, the exhaust from each being carried into the low pressure steam line. The meter showed a flow of 2000 pounds of steam per hour when neither the hammer nor the engine were operating. A check indicated that this was due to leakage through a worn valve in the hammer. When the hammer only was operating the total steam flow was 2600 pounds, but the 2000-pound flow continued during the 24 hours whether or not the hammer was in operation. Further investigation showed that steam hammers are often offenders, sometimes because of worn valves and sometimes because of a method of operation which includes the holding of the hammer in the raised position with the steam valve open. This illustration is one example of the many possible uses of the flow meter. It is conceivable that there may be instances in which the need for greater boiler or air compressor capacity may be obviated by the intelligent use of such a meter.

Improvements in Freight Service

THE establishment of 175-hour freight service between Chicago and California points by the transcontinental lines was reported in the traffic news of the *Railway Age* of June 2. This is a reduction of 24 hours in the old schedule, giving eighth morning delivery from Chicago to Los Angeles and San Francisco, and making possible eleventh morning delivery between New York and the California cities. This is merely another instance of the determination of the railways to improve their freight and passenger service wherever possible. The principal beneficiaries of this improvement in freight service will be the shippers. So far as the railways are concerned, the first effect will probably be some increase in operating expenses. As pointed out by W. B. Storey, president of the Santa Fe, in a newspaper statement, the trains on the faster schedule will have to run a little lighter in tonnage, resulting in more train miles and less revenue per train mile. On the other hand, faster service usually develops new business, and the improvement in the schedules between the East and the West should not be an exception to this rule. The railways have been commended in the past for rendering superlatively good transportation service. They are showing that even better performance can be accomplished. The benefits to shippers are unquestionable. The benefits to the railways themselves are more doubtful. Fast service is expensive, and it cannot be said that the shipping public or regulating authorities show a disposition to let the railways charge rates or earn net returns proportionate to quality of the service rendered.

The Cincinnati Operating Committee

DURING government operation ten important railway terminals in various parts of the country were under the control of operating committees. The membership of these committees consisted of local operating officers, who met periodically for the purpose of establishing unity and co-operation among the railways entering the terminal. It may be recalled that the work done by these committees ranged all the way from excellent to negligible. However, that may be, nine of the ten committees were disbanded upon the expiration of federal control. For reasons outlined in an article appearing elsewhere in this issue, the tenth committee, the one at Cincinnati, did not disband. In fact, it has since largely increased the scope of its activities. The results obtained have amply justified its continuance. Last year, for example, 733 cars were transferred because of bad order in the terminal, as compared with 10,935 cars in 1923. In all, 1,769 exceptions on less-than-carload freight were cleared up. The problem of excessive smoke, which has been particularly acute in Cincinnati, was brought to a satisfactory solution

Many other benefits resulted, as outlined in the article, all attributable to the activities of this committee. These activities afford an excellent object lesson of the value of co-operation among railways, which is worthy of careful study on the part of operating executives of railways entering other large terminals.

Roadway Expenditures

AS indicated in statistics compiled by the Bureau of Railway Economics and published in the issue of June 16, page 1392, the railways spent $26,594,000 less for capital improvements in the first three months of 1928 than in the corresponding period last year. Of this decrease $4,264,000 was in roadway and structures accounts. An analysis of these figures shows that this decrease occurred in the "additional track" and "shop and engine house" accounts, which showed reductions of $5,401,000 and $2,977,000 respectively, or a combined reduction of $8,378,000. This decrease is due to the fact that the appropriations for all accounts carried over incomplete from 1927 into 1928 aggregated only $323,692,000, as compared with $455,828,000 from 1926 into 1927, for the new authorizations in the first three months of 1928 exceed those for the same period last year by $1,040,000. Even more important from the roadway standpoint, however, is the fact that the expenditures for roadway accounts other than additional tracks and shops and engine houses exceeded those for the first three months of 1927 by $4,114,000. Indicative of the trend in roadway expenditures is the fact that the amounts spent for heavier rail this year exceeded those of last year by $1,346,000 or 16 per cent and for additional ballast by $382,000 or 25 per cent. In other words, while the roads are completing many of the major construction projects authorized in 1926 and 1927, they are strengthening and improving their tracks and structures on a more liberal basis than ever before. This tendency deserves special consideration for it is contributing very largely to the constant improvement in operating performance. It is also being reflected in a reduction in maintenance of way expenditures, particularly in the amount of labor required to maintain the tracks and structures to the desired standards.

Preventing Derailments in Car Retarder Yards

IN yards equipped with car retarders, the switches are power-operated and controlled by the same men who handle the operation of the retarder. Although located in towers at central points, it is often difficult for the operator to judge the location of a rapidly-moving car with reference to a switch, and particularly in foggy weather or when cars are coming too close together, he may throw a switch under a car, and cause a derailment that not only results in considerable damage but ties up yard operation. In an ordinary interlocking, such an accident is prevented by electric locks on the levers, controlled by track circuits which are shunted by a train or a car on the section of track including the switch. This protection has not been provided in the majority of yards equipped with retarders, for the fear that the use of track circuits would slow up the operation of the yard. This problem has been solved satisfactorily, however, in the New York Central yard at Selkirk, N. Y., where a special single-rail quick-acting track circuit was installed. By this means the operation of the yard is not slowed up, because the insulated joints for the track circuits are so placed as to permit a safe minimum headway between cuts of cars. Power-operated switches and car retarders should be installed to conform to the latest standards of safety and construction that have been developed for other signaling equipment. The track circuit, which is the fundamental protective feature of interlocking, can and should now be included in car retarder installations.

Is Cost Accounting Impractical?

IT has been contended that detailed cost keeping by the railroads is not worth the expense which it entails. Those who take this position usually have in mind the motive which prompts a manufacturer to keep account of the cost of producing his product—that of determining a selling price that will insure a fair profit. To apply this principle to efforts to determine the fairness of the freight rate on any given commodity involves untold complications because of the many elements of cost involved and the difficulty of isolating those proportions of all the elements which apply to the particular service performed.

Those who offer this argument fail to take account of any other occasion for a detailed knowledge of costs. Granting that the railroads cannot hope to obtain the actual cost of each item of their finished product in the form of transportation service, they can at least make efforts to ascertain the unit costs of many items that enter into the conduct of their operations and there are good reasons why such costs would be of value. There never has been a time in railway history when more thought has been given to the use of new methods, improved materials and labor-saving equipment. But without critical cost studies it is difficult if not impossible to determine the merits of the various innovations proposed or introduced.

By way of illustration, reference may be made to the growing practice of taking one track of a multiple-track line out of service to expedite the conduct of rail renewal or ballasting operations. The officers of some roads have frowned on this system, contending that any saving in the cost of track work is offset by increased expenses in transportation due to delays to trains. Detailed cost analyses should make it possible to determine the facts in any given case.

Another objection to cost accounting is that any data, to be of value, must be available in more finely divided units than are now commonly obtained, and that to effect a greater subdivision imposes an unfair burden on the foreman who is usually not qualified to carry out the accounting of labor charges that this would involve. That this obstacle is not insurmountable is demonstrated by the methods pursued by the Chesapeake & Ohio in its maintenance of way organization and the economies which have been secured through an analysis of the costs of doing work in different ways. The St. Louis-San Francisco has also found it of advantage to keep detailed accounts of the expense of renewing ties and other operations, while the Delaware & Hudson is keeping a record of the painting of its bridges and buildings, which not only insures a check on the performance of the gangs but also provides data that afford a measure of the service rendered by different makes of paint.

Even with such examples before them, not a few railway men contend that many operations are so complex as to defy a basic analysis of costs with anything short

of an excessive outlay. But what may be done when the inducement is sufficient is illustrated by the work done under the auspices of the Presidents' Conference Committee and the valuation forces of the individual roads in arriving at the elements of cost entering the single operation of track laying as outlined in the article by H. E. Hale on page 1383 of the *Railway Age* of June 16. These findings are admittedly the result of enormous efforts entailing an expense that could not be justified in cost accounting for routine railway operations, but they show that such work as track laying, even with a great variety of variables, is capable of thorough analysis. It would be unfortunate if some of the results of this work could not serve as the incentive and guide for a closer scrutiny of the elements of cost entering into the everyday work of the maintenance of railway tracks.

Pensions—What Some Industries Are Doing

INDUSTRIAL executives have been staggered as they have come to realize the eventual great cost of pension plans, many of which were entered into without first having had a careful survey and study made by competent experts. The seriousness of these costs has been explained and commented upon in recent editorials in these pages.

In spite of these facts, which are now coming to be quite generally recognized, more and more industries are inaugurating pension plans. They must see concrete advantages in such plans, or they would not go forward with them. What, if anything, are they doing to develop a more constructive handling of the problem? In the *Railway Age* of June 2, 1928, and again in the issue of June 16, 1928, the importance of the contractual feature was commented upon. One present tendency, which is quite evident and promises to reduce the burden on industry, and which at the same time almost automatically introduces the contractual feature, is the increasing popularity of the contributory plan, in which the employees bear part of the cost of the pensions.

A pension study now being made by the Industrial Relations Counselors, Inc., indicates that of the pension plans in industrial, railroad, commercial and financial organizations, for which the date of inauguration is known, of those adopted prior to 1915 about 13 per cent were contributory; of those adopted between 1916 and 1920, inclusive, about 16 per cent, and of those adopted between 1921 and 1925, inclusive, more than 25 per cent.

"The main reason why the costs of a pension plan should be borne jointly by the company and the employees," says J. C. Clark, "is that both receive benefits from it. Another important reason is that employees will have a greater appreciation of the pension plan if they are helping to pay the cost."

It must not be assumed, however, that because of these advantages, as well as the tendency to encourage habits of thrift on the part of employees, there are not serious objections, at least on the part of some industrial managements, to some phases of the contributory type of pensions. If, for instance, the money contributed by the employer and the employees goes into a common fund, the employer enters into a contractual obligation and is forced to set aside certain funds from the business for the purpose of building up a pension reserve. He also finds himself very definitely committed to heavy obligations which mature in the distant future. Then, too, a contributory system can hardly be effective unless participation on the part of the employees is compulsory; this introduces complications of various sorts as to the collection of payments, accounting, etc., and there is the possibility that such a plan may be regarded unfavorably by the workers. A contributory plan is often accompanied by a demand for joint management; some employers hesitate to enter into such an arrangement, although in the railway field there are now a number of examples of enthusiastic and hearty co-operation in joint projects of various sorts. The withdrawal of workers from the service necessitates a repayment to them of such amounts as they may have paid in, with a reasonable rate of interest; this, particularly where the labor turnover is high, adds greatly to the costs of administration. Indeed, a joint enterprise of this sort makes necessary a much closer administration of the pension plan, with frequent check-ups, thus considerably increasing the costs.

Conant, in his book on "A Critical Analysis of Industrial Pension Plans," closes his discussion of the contributory plan with these words: "Notwithstanding these disadvantages, the contributory system, because of its recognition of contractual rights, the fact that in a large measure it meets the issue of deferred pay, and that it tends to place part of the responsibility for providing against superannuation upon the individual, is distinctly superior to an ordinary 'discretionary' system wherever it can be made practically operative. With certain classes of workers and under some conditions, however, the practical difficulties inherent in the contributory plan in the case of industrial establishments may be insuperable."

Edward S. Cowdrick, in his recent paper, "Pensions: A Problem of Management," presented before the American Management Association, points out that there is apparently a tendency in the direction of separating the funds furnished by the employer from those contributed by the employees. There seems to be a suggestion in this of the possibility of a satisfactory solution of the pension problem in industry. Mr. Cowdrick's point of view can best be expressed by using his own words: "This arrangement, which may perhaps be designated as a co-operative pension to distinguish it from the older type of contributory plan, usually provides that the employer shall pay a bare subsistence pension at his own cost, either to all employees or only to those who participate in a separate annuity fund built up by their own contributions. Under a plan of this kind the portion financed by the employees becomes in fact a savings fund from which the man who leaves the company ordinarily may withdraw his share, but out of which he gets an annuity if he remains in the service until he reaches a prescribed age. Sometimes other benefits (for example, disability insurance) are combined with the pension arrangement. This type of co-operative pension plan is attracting wide attention among students of the subject, to some of whom it gives promise of pointing toward an ultimate solution of the whole pension problem. Even the most cautious of us must admit that the principle of using the employee's savings to help support his old age is sound. Whether any existing plan of tying up these savings with a formal pension will prove wholly satisfactory is a question which cannot adequately be answered with the present short experience."

Some railroads have had considerable experience with the contributory plan in relief and hospital work. Might it not be advantageous to consider its application to the pension plans?

"Helping Business" by Hurting the Railways

IN an editorial in the *Railway Age* for June 16, entitled, "Competition and the Railways", we emphasized the constant pressure for reductions in rates to which the Interstate Commerce Commission, and the railways themselves are subjected by the various territories and communities, in their efforts to secure competitive advantages over each other, or to free themselves from competitive disadvantages from which they believe themselves to be suffering.

A minor incident that occurred recently in the Chicago office of the *Railway Age* illustrates what is incessantly going on. An employee of the Chicago Association of Commerce called and asked a member of our staff to take an individual membership in this organization. He was asked why this should be done, and replied that it was because the association was promoting the interests of Chicago. Asked to state specifically what the association was accomplishing for Chicago, he cited the "constructive work it had done in behalf of the development of a waterway from Chicago to the Gulf". Being asked to give another example, he added that it had been instrumental in getting a reduction in freight rates to the southeast.

The only reason he gave why the Chicago Association of Commerce should be supported was that it had been working effectively to reduce railway earnings in two different ways; first, by diverting traffic from them to a waterway, and, secondly, by reducing rates on traffic that could not move by water. The association includes in its membership both the railways and numerous companies which manufacture equipment and supplies to sell to the railways. Whatever reduces railway earnings is, of course, directly injurious both to the railways and to the railway equipment and supply industry, and yet this representative of the Chicago Association of Commerce saw no inconsistency in the use of the funds of the association for this purpose. No doubt the officers of the association had told him what arguments to use, and believed the attitude of business men to be such that furnishing them evidence that advantages were being secured for Chicago at the expense of the railways would be most likely to induce them to join the association.

Chicago boasts that it is the largest railroad center in the world. It owes its rapid growth in population and business largely to good railway service, favorable railway rates, and large expenditures by the railways in making purchases from Chicago business interests and paying wages to labor living in the Chicago district. Its business leaders would not regard any effort that tended to reduce the amount of business done by the Chicago manufacturing, commercial and financial interests, or the prices they could get, as good for Chicago. Why, then, do they regard as beneficial to Chicago efforts to divert traffic from the railways to waterways, and to reduce railway rates on freight moving into and out of Chicago? They constantly demand large expenditures by the railways in the Chicago district for electrification, for the construction of monumental passenger stations, for the elevation of tracks and other improvements. Why, then, do they constantly seek to reduce the earnings of the railways serving Chicago?

We have not cited the attitude of the business interests of Chicago toward the railways because it is exceptional. We have cited it because it is typical. If it were exceptional it would not be so important. The future of the railways is in danger largely because this same attitude is assumed by the business interests in almost every territory and community. Everywhere business men profess that they want the railways to continue to render good service, and to earn a fair return in order that they can do so, yet at the same time oppose advances and seek reductions of rates. In most instances if asked why they pursue this course, they will answer that they are discriminated against, and that all they want is to be put on a parity with their competitors. But it cannot be that every community and territory is discriminated against in the matter of rates. The plain fact is that back of all this pressure for reductions in rates is a desire on the part of the business interests responsible for it to get reductions for themselves, regardless of the effect on railway earnings. Doubtless they charitably hope that territories and communities other than their own will have their rates maintained or advanced; and that thus the railways will get a fair return mainly at the expense of others.

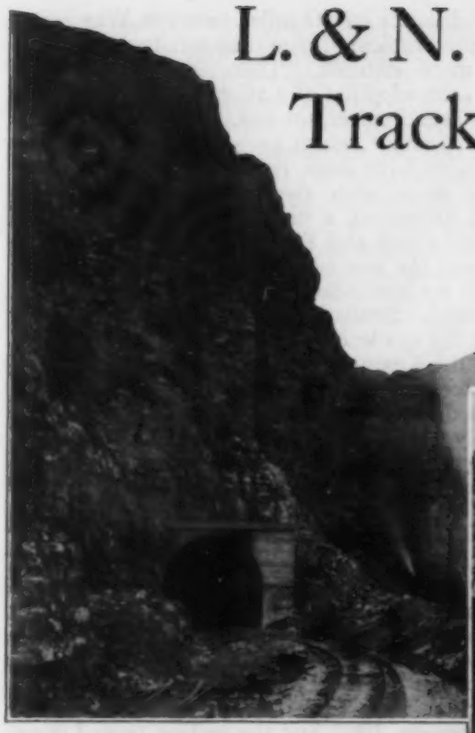
We often hear business men complain because of the alleged inconsistency and selfishness of labor leaders and railway employees in constantly seeking advances in wages, regardless of the effects on railway earnings. The plain fact is that most business men have no justification for complaining about the course of labor leaders and railway employees in this respect, because their own course with respect to rates parallels perfectly the course of labor leaders and railway employees in regard to wages.

It has repeatedly proved impossible for the railways successfully to resist this constant, powerful pressure for both advances in wages and reductions in rates. It proved so irresistable before the war that the railroad industry was brought to the verge of ruin. Railroad development was arrested and the country suffered enormous losses, owing to the resulting large and prolonged shortages of transportation. The same kinds of pressure are now being applied as before, and with the same effect upon the returns earned by the railways. The average percentage of return earned on railway investment in 1927 was the smallest since 1922, and thus far in 1928 it has been less than in 1927. In consequence, both investments in railway improvements and expenditures for maintenance are being reduced, just as they were in the years before the war. It will not be necessary for the tendencies now prevailing in the railway industry to prevail many years in order to make the general railway situation as bad as it was before the adoption of government operation.

Is there no "enlightened selfishness" among the business men of the country regarding railway matters? There is plenty of selfishness, but is there any that is "enlightened"? It is just as essential to the welfare of the industry and commerce of the country that the railways shall earn adequate net returns as it is for the welfare of the railways themselves. The railways are now rendering the best service in history. The attitude of business interests generally shows that they do not appreciate the value of this service, because, if they did, they would be willing to pay enough for it to insure a continuance of it. If they continue to show unwillingness to pay what they should for the kind of service they are now getting, they will probably in due time get only the kind of service for which they are willing to pay. And when that time comes no doubt they will be heard loudly complaining again about transportation conditions which they have done their best to create.

L. & N. Completes Second Track on Kentucky Division

Improvement is an important feature of program for better facilities for heavy coal traffic



Above—South Portal of Tunnel No. 18. At the Right—A view of Tunnel No. 14 as Seen Through Tunnel No. 15. Old Line on the Right.

ON FEBRUARY 10, trains on the Kentucky division of the Louisville & Nashville commenced operation over the last section of second track in the 13 miles between Conway, Ky., and Sinks, thereby marking the completion of continuous double track for 255 miles between Harlan, Ky., in the Southeastern Kentucky coal fields, and Covington, Ky., on the Ohio river. This improvement embraced the building of second track and the revision of grades over 185 miles of the Kentucky division from Covington to Corbin and for 70 miles over the Cumberland Valley division from Corbin to Harlan, and comprises an important part of the general program for increasing traffic capacity and reducing operating costs in the handling of the growing coal traffic originating in the Eastern Kentucky and Southeastern Kentucky fields which the Louisville & Nashville has carried on progressively since 1906.

This article deals with the general program for the double tracking and grade revision on the Kentucky division, which is the easterly of the two north and south trunk lines of that system and comprises the main through route from Cincinnati through Knoxville, Tenn., to Atlanta, Ga. It also gives a detailed account of those units of this project which have been carried out during the past four years. Improvements on the Cumberland Valley division, which joins the Kentucky division at Corbin, and on the Eastern Kentucky division, which connects with the Kentucky division at Richmond and Patio, were described in the *Railway Age* of March 8, 1924, page 537. The extent of the coal traffic handled by the Louisville & Nashville from the Eastern and Southeastern Kentucky coal fields, its growth and the manner in which it is handled, will be described in another article to appear in an early issue.

General Characteristics

The Kentucky division traverses the drainage basins of three important streams, in each of which the line has essentially different characteristics. In the most northerly of these, that of the Licking river, the line follows the water grade of the river and its south fork to Winchester, which is on the watershed between that stream and the Kentucky river, rising from Elevation 525 at Covington, to Elevation 972 in a distance of 95 miles. The country is a moderately rolling one which encouraged the adoption of light grades even in the days of light construction during which the line was built, with no continuous ascents in either direction more than four miles long.

Between Winchester and Boone Gap, a distance of 38 miles, the line traverses the drainage basin of the Kentucky river but, unlike the location in the valley of the Licking river, it lies across the general direction of the drainage, crossing the river itself at Ford, Mile 107, and one of its tributaries at Silver Creek, Mile 127. This location embraces marked changes in elevation, including a continuous descent from Winchester, at Elevation 972, to Mile 108 at Boonesboro, at Elevation 610, a distance of 11 miles; and an ascent to Elevation 1000 at Mile 120 between Richmond and Fort Estill. Similar but less pronounced changes in elevation occur in the 15 miles to Boone Gap, on the watershed between the Cumberland and Kentucky River valleys. This portion of the line embraces heavy curvature with grades in excess of one per cent over considerable distances.

The descent into the valley of the Cumberland river is effected by following the course of Roundstone creek for 20 miles from Elevation 1070 at Boone Gap, to the crossing of the Rockcastle river at Livingston at

Elevation 885. Throughout most of this distance the grades are light, but in the lower reaches of Roundstone creek it lies in a crooked, narrow valley which the railroad follows at the expense of heavy curvature and numerous tunnels.

For a distance of six miles south of Livingston to Hazel Patch, the line lies in the valley of the Rockcastle river and then makes an abrupt ascent of about 300 ft. in a distance of about five miles to East Bern-

The Kentucky, Eastern Kentucky and Cumberland Divisions of the Louisville & Nashville

stadt in the foothills of the Cumberland mountains, which are traversed over a choppy grade line for the remaining 21 miles to Corbin. The heaviest grade on this portion of the line is between Hazel Patch and East Bernstadt, being equivalent to 1.69 per cent compensated.

Had To Meet Needs of Coal Traffic

With the rapid development of coal mining operations in the Cumberland field during the early years of the present century and in the Eastern Kentucky fields, a decade later, the need for improvements designed to increase capacity and reduce operating costs became apparent and studies were made for the development of a program of second tracking and grade revision on the Kentucky division. These showed that ruling grades of 0.3 per cent against the northbound or loaded movement and 0.5 per cent against the southbound movement could be obtained readily in the 95 miles between the Ohio river and Winchester. However, in the distance of 90 miles between Winchester and Corbin, the problem of obtaining satisfactory grades was much more difficult. These investigations led eventually to the adoption of a ruling grade of 0.65 per cent against loaded movement and 0.85 per cent against southbound or empty return movement, and these established grades have been rigidly adhered to in the second-track work with three exceptions. Between Ophelia and Richmond, a distance of four miles, and between Hazel Patch and East Bernstadt, five miles, it was found that the cost of eliminating grades of 1 per cent and 1.69 per cent against southbound traffic cannot now be justified. Similarly, it was found that the cost of reducing the grade on the 10 miles of northbound ascent from the Kentucky river to Winchester was materially in excess of the capitalized cost of helper service over this distance. But, whereas the helper service had formerly been necessary for the entire 58 miles from Livingston to Winchester, it is now confined to the 10-mile stretch of northbound grade from Ford to Winchester.

First Work Between Corbin and Sinks

As coal traffic was developed earlier in the Cumberland field, the first step in the program for second track embraced the 35 miles of line between Corbin and Sinks, which is the junction between the Kentucky division and the Lebanon line to Louisville. Started in 1906, the first section from Sinks to Livingston was completed in February, 1907, and the section from Livingston to Corbin in December, 1908.

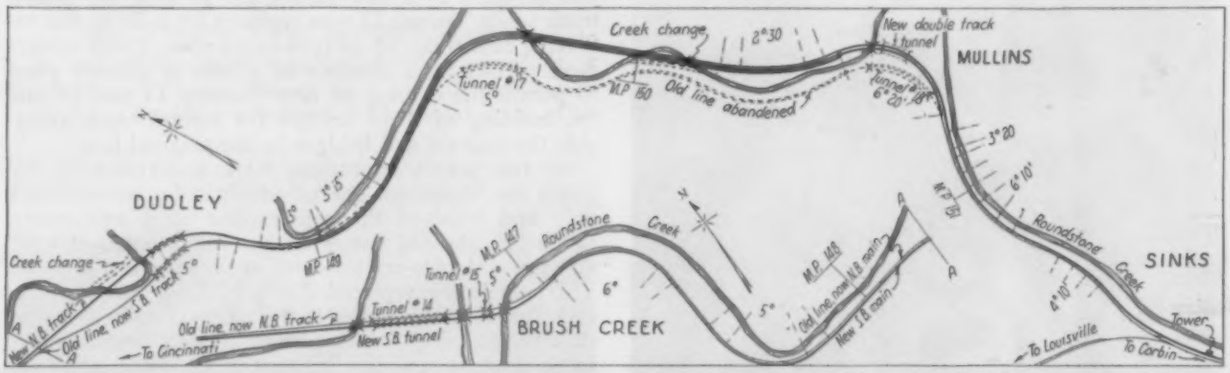
With the prospect of heavy coal traffic on the Eastern Kentucky division, work was undertaken in 1910 on the construction of a second track from Covington to

Piers for Bridge Over Roundstone Creek on New Double-Track Line North of Tunnel No. 18

Paris, a distance of 78.7 miles and the construction of a modern classification yard at Decoursey (five miles south of Covington). This was followed in 1912 by the inception of second-track work between Paris and Winchester and as a result the portion of the line between Covington and Winchester was completely double tracked in 1914.

The remaining 54.7 miles of single track between Winchester and Sinks embraced a territory in which

second track construction was most difficult and expensive and where, with the growth of traffic, construction would introduce the greatest interference with operation. This improvement was therefore deferred until 1923 when the growth of the coal traffic between the Cumberland field and Decoursey yard had reached a point where the improvement became imperative. It was concluded that it would be advisable to undertake work over this entire district at once because of the interference with traffic. It was therefore decided to start work first on the 18.5 miles between Conway and Fort Estill because a considerable part of the work in this territory involved changes of location which could be carried out without interference with traffic. Furthermore, the revision of grades in this district had the effect of cutting the helper service from the 58 miles between Livingston and Winchester to the 10 miles from Ford to Winchester, and, with the improvements in operation to result from this, as well as from the use of double track over the distance from Conway to Fort Estill, the delays to trains incident to construction work on remaining portions of the line were of less consequence.



Map Showing Heavy Curvature and Tunnels in the Valley of Roundstone Creek

Difficult Tunnel Work at Boone Gap

This unit of the work involved the construction of two pieces of double-track line independent of the old location for distances of 3.7 and 5.1 miles respectively and changes of grade over the remaining part of the old alinement to a maximum of 12 ft. It also required the enlargement of a short tunnel at Berea for double track and the construction of a new tunnel 814 ft. long for a new northbound track at Boone Gap, about 200 ft. east of the tunnel for the old line, which was retained for the southbound track. The driving of this tunnel involved complications. The material encountered is a soft blue shale that required careful timbering. The south approach to the tunnel embraced a cut requiring the excavation of 138,000 cu. yd. of material, largely rock. Therefore, to avoid delaying the tunnelling operations until the cut could be taken out, it was necessary to drive the tunnel from the north or uphill end, which naturally introduced difficulties of drainage until the tunnel was holed through. The total excavation on this 18.7 miles of line amounted to three-quarters of a million cubic yards.

Shortly after the completion of this portion of the work in June, 1925, work was started on second tracking the 23.6 miles between Winchester and Fort Estill. With the exception of a 3,000-ft. change of line near Patio to eliminate some sharp reverse curves and the separation of the new and old lines at several tunnel locations and the crossing of the Kentucky river, this work was carried out by paralleling the existing track.

Looking South on New Northbound Track Toward Portal of Tunnel No. 16. Old Line on the Right Was Retained for Southbound Track

Grade revision was restricted to the smoothing out of summits and dips between Riverside and Ophelia and to reducing the southbound adverse grade between Richmond and Fort Estill Junction. The principal features of the construction work were the driving of three single-track tunnels parallel to existing tunnels, the "daylighting" of two tunnels for double track, the construction of a short detour to eliminate one of the old tunnels, and a new bridge for second track across the Kentucky river. This section of the work was completed in May, 1927.

How the Arch Timbering of the Double-Track Tunnels Was Supported Without the Use of Side-Wall Timbering

Last Section Between Conway and Sinks

The last section of the line to be double-tracked, namely that between Conway and Sinks, upon which work was started on September 27, 1927, embraced only 13 miles of line but it embodied many interesting features. This portion of the line lies for its entire length in the valley of Roundstone creek which has gently sloping sides, one-half mile or more apart in the vicinity of Conway, but changes its characteristics a few miles further south to that of a steep-sided canyon with walls from 50 to 200 ft. high which in some places are only 400 to 500 ft. apart. Futhermore, it follows an exceedingly winding course, in one place making two complete 180 deg. reversals of direction that required three bridges and two tunnels for the railroad in a distance of 1,800 ft. In fact, the old line had seven tunnels in a distance of 6 miles.

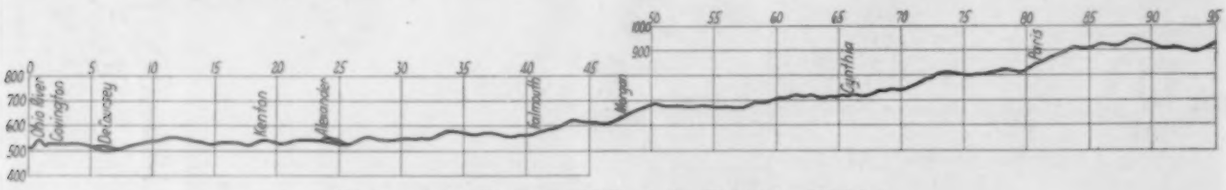
For the first six miles the second track was built parallel to the old track except at a point about one and one-half miles south of Conway where a change of line for double track was made for a distance of 3,600 ft. to replace two 6-deg. and one 4-deg. curves with one curve of 1 deg. and one curve of 2 deg. with a reduction of 65 deg. in central angle. This change involved a cut 70 ft. deep which called for 88,000 cu. yd. of excavation but involved overbreaks that resulted in a total yardage of 155,500 cu. yd.

A relocation for a new double-track line 6,800 ft. long eliminated old Tunnels 12 and 13 and also effected a marked improvement in the alinement. Tunnel 12 was replaced by a new tunnel 650 ft. long for double track while Tunnel 13 was replaced by a 70-ft. cut involving 52,000 cu. yd. of rock excavation. Track centers were spread for a distance of a mile at another place to permit the driving of new Tunnels 14 and 15 and the building of three bridges for second track alongside the tunnels and bridges in the original line.

At two points relocations were undertaken to improve the alinement, one of which is for second track only and involved the construction of a new tunnel parallel to the old one while the other involved 8,000 ft. of new double-track line on an independent location. This relocation replaced Tunnel 17 by an open cut and Tunnel 18 by a double-track tunnel 567 ft. shorter than the old single-track tunnel. This change resulted in an improvement in alinement at the expense of two additional crossings of Roundstone creek, one of which was built for three tracks to accommodate a passing track. Both of these line changes involved channel changes, one requiring 25,000 cu. yd. and the other 55,000 cu. yd. of excavation.

Care Exercised to Safeguard Operated Line

Between Tunnel 18 and Sinks it was necessary to widen a side-hill cut 2,700 ft. long which involved the taking out of a slab of rock having a maximum thickness of 15 ft. and a height of 10 to 70 ft., in such a way as to avoid rock falls that would block the operated track or interfere with train movements. This obviously required extreme care in shooting. Holes 8 ft. center to center were drilled along the slope of the cut to ditch level and loaded with 12 sticks of explosive per hole at the bottom and six sticks at one or two points above, depending upon the depth. Horizontal holes were also driven in from the track level, providing about six holes from the face for one hole drilled from the top, these horizontal holes being loaded with about six sticks each. In some cases also, holes were drilled in from the shovel face. In shooting, the bottom holes were fired direct with first-delay retarders on the back holes, and in no case was more than 8 to 16 ft. of rock, (measured in the direction of track) shot down at one time. Care in handling the shots made it possible to reduce train delays on account of rock falls to a minimum, but the precaution was always taken to cover the rails of the operated track with ties or timbers to avoid injury from falling rock.



Profile of the Northern Half of the Kentucky Division

The rock encountered in the cuts and tunnels is of sedimentary origin with horizontal stratification. This

included limestone, sandstone and shale and, except in Tunnel 16, the material is of a nature that arches safely for a single-track tunnel. In Tunnel 16 as well as in the double-track Tunnels 12 and 18, it was found necessary to provide timbering and install concrete lining. In the cases of Tunnels 12 and 18 it was not necessary to timber the walls or support the arches on posts. Instead, the tunnel arches were taken out large enough so that the plates for the arch sets could be supported on shelves cut back at the tops of the tunnel side walls. This is well illustrated in one of the photographs.

All Tunnels Have Concrete Floors

In accordance with practice on the Louisville & Nashville, all of the tunnels were provided with concrete floors having a minimum thickness of 8 in. This

New Bridge Over Roundstone Creek and Double Track Cut Which Replace Old Line and Tunnel No. 13, Left

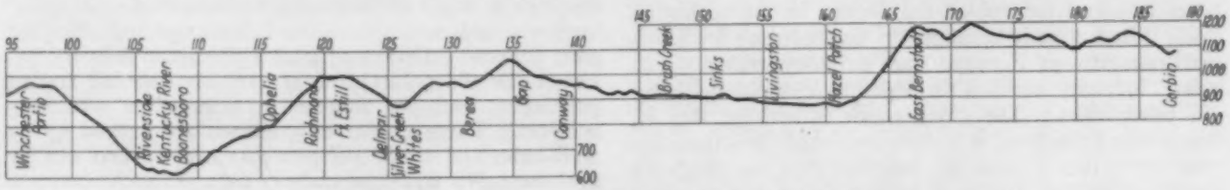
practice, together with the laying of rails through tunnels in 66-ft. lengths, have well justified their cost in the form of reduced track maintenance.

Tunnels were all driven by the full top heading method, using 8-ft. steels in the drills and pulling about 7 ft. to the shot. The heading muck was dumped over the bench and removed with the bench muck by an air-operated shovel. Holes for moving the bench were drilled vertically at a spacing of three feet in each direction. In lining the tunnel, use was made of a staging erected on a flat car at a sufficient height so that buckets supported on it could be dumped directly into the side fall forms and afford a convenient working elevation for the men shoveling concrete on the arch centers. By means of a gasoline locomotive these platform cars were hauled between the tunnel and a mixer plant where the concrete buckets were filled, a three-rail track being provided so that standard flat cars could be handled by a narrow-gage locomotive.

Type of Concrete Plant and Platform Car Used in Lining Tunnels—Note Three-Rail Track for Use of Gasoline Locomotive

The second track construction was divided between contract and company forces in accordance with the policy of the Louisville & Nashville to do with its own forces all grading and bridge work that interferes with train operation or introduces possibility of any hazard to train movements. Rinehart & Dennis of Charlottesville, Va., had the contract for the work between Conway and Sinks except for Tunnel 18 which was driven by W. J. Sparks of Mt. Vernon, Ky. Boxley Brothers, Orange, Va., had the work between Ft. Estill and Patio. All grading by the contractors was handled with narrow-gage cars but the company work, being done in close quarters, was handled in standard-gage cars on the operated line.

The 54.7 miles of second track and grade revision work between Patio and Sinks, which was carried on between 1923 and 1928, involved a total expenditure of approximately $8,000,000, required the excavation of 2,350,000 cu. yd. in the grading operations and the placing of 75,708 cu. yd. of concrete in bridges and tunnel linings. Nine new tunnels aggregating 5,360 ft. in length were constructed and 7 tunnels aggregating 3,869 ft. were eliminated. The work has been carried out under the supervision of W. H. Courtenay, chief engineer and G. R. Smiley, chief engineer of construction. J. B. Cochran was resident engineer of the work between Conway and Sinks.



Profile of the Southern Half of the Kentucky Division

How Consolidations Affect Movement of Traffic*

Every railway constantly seeks the "long haul" and affiliation or combination with railways that will increase its business

Part II

By Dr. Julius Grodinsky
University of Pennsylvania

TO a lay inquirer, one who is outside the select circle of railroad officialdom, it is astonishing to observe the certainty with which traffic diversion from one line to another follows the acquisition of one line by the other. The originating road directs more traffic to the connection that now controls it, and less to the others.

Inquiry must therefore be made into the forces which contribute to the diversion of traffic from one through route to another merely because of a change in the corporate affiliations of the roads concerned. The rapidity with which traffic can be diverted as a result of a realinement in the control of properties is well illustrated by the temporary acquisition of stock control in the St. Louis Southwestern by the Chicago, Rock Island & Pacific. The latter originates considerable lumber and oil traffic on its lines in southern Arkansas and northern Louisiana, which is destined for points beyond St. Louis. The lines of the Rock Island in this territory, however, terminate at Memphis. There is no physical connection between the east and west lines of the Chicago, Rock Island & Pacific, radiating from St. Louis and Memphis, short of El Reno, Oklahoma; and traffic from its Arkansas and Louisiana lines cannot be routed via that point on account of the long-and-short haul clause of the Interstate Commerce Act. The Rock Island is thus compelled to deliver St. Louis-bound traffic at Memphis to other lines for transportation northward; primarily to the Illinois Central and the St. Louis-San Francisco.

The St. Louis Southwestern operates a short line from southern Arkansas to St. Louis and interchanges physically with the Rock Island at Brinkley and Fordyce, Arkansas. Within two months after the latter acquired control of the former in the spring of 1925, it had already arranged to divert to the St. Louis Southwestern at Fordyce and Brinkley traffic which it had formerly handled through the Memphis gateway via other lines. The chief traffic official of the St. Louis-San Francisco, in a statement made less than one year after this acquisition, asserted that his road felt the effect of the change in control; and that the road knew that the traffic was being taken away from it. "And," he continued, "good sense tells us that possibly that would be the case if we had control. We would work to that same end. Now, these kinds of influences would work directly as between the Frisco and the Cotton Belt."

Consolidations and Diversions of Traffic

The community of interest effected between the St. Louis-San Francisco and the Chicago, Rock Island & Pacific will tend to redivert the latter's traffic from its Arkansas and Louisiana lines to the former's route from Memphis to St. Louis. The management of the St. Louis Southwestern would not be surprised at such a result. Its traffic manager stated recently, "I don't recall any business that the Rock Island delivers to us that could not be delivered to the Frisco equally well, thus giving their system line a full haul." And the St. Louis-San Francisco expects this diversion; for its chief traffic official asserted in the spring of 1927, that, "A large proportion of this (Rock Island) traffic could undoubtedly be controlled by the Frisco from Memphis to Thebes and East St. Louis."

In examining into the forces which enable the originating road to control the routing of traffic, the attitude of the shipper must be considered. Assuming that rates are the same over all routes, a shipper will route traffic over that line which affords him the best service (aside, of course, from any considerations of personal favoritism). Excellent service comprehends such things as time required for delivery, safety of goods in transit, promptness in settling claims and tracing shipments, and frequency and reliability in train service. If the shipper is satisfied along these lines, he cares little over what particular routes his shipment moves. It has been well said by high railroad authority that "so long as the quality of service is maintained, the question of routing should not be of material interest to the shipper."

This is the crux of the situation. Every road endeavors to furnish the best type of service it can. It employs a staff of salesmen to solicit the shippers' business and to explain the advantages of shipping over its road. One road makes prompter delivery between selected points; another affords superior transit privileges; and yet another performs free switching services. These armies of salesmen are backed up by well-conceived traffic policies that are worked out by the executive traffic officials.

In this competitive struggle the home road is ordinarily successful in capturing the business. It succeeds because it can supply the best service; primarily, because it is the home road. The immense power enjoyed by the initial carrier in obtaining a shipment for its long haul is but little understood. Its resultant ability to divert large volumes of traffic from one connection to another, thus changing established trade routes and channels of commerce, cannot be ascribed to artificial factors. It is the result of the working of sound business principles.

* This is the second of two articles in which the author emphasizes and illustrates the influence of competition for traffic upon the attitude of railway officers toward plans for consolidations. The preceding article was published in the *Railway Age* of June 23, 1928.—EDITOR.

Advantages of the Originating Carrier

The primary advantage of the originating carrier is due to its proximity to the shipper. Its representatives are constantly accessible to him; and they are usually thoroughly known to him, as well. It furnishes him with his industrial sidings; it delivers his carloads on its team tracks, and it stores his less than car-load shipments in its transfer house. If the shipper wants any cars he is obliged to call on the initial line; and if he wants spotting privileges, this line must perform the work. In industries long established on the road, the physical layout of the plant is frequently adjusted to the physical plant of the carrier.

The size or financial strength of the home lines from this viewpoint are not important. As home lines, they have it in their power (assuming reasonably good management) to afford a superior grade of service. The strategic position occupied by large shippers at important industrial and commercial centres may obscure the vital underlying situation. They may seem to hold the whip hand, and they are not influenced by powerful dominant trunk lines, than whom in many cases they are financially stronger. So complete is this control over traffic routing by large shippers, that they frequently allocate their tonnage arbitrarily between various railroads. The larger the shipper, the more likely is this practice to be followed; assuming that the service afforded by all roads is substantially the same. But the process of consolidation disturbs this very equilibrium of equality in service.

For the acquisition of one road by another results in the establishment of a superior standard of service over the route formed by and with the acquiring road; and of an inferior grade of service to a greater or lesser degree by and with a route formed with a road which competes with the acquiring road. The discrimination in service does not always develop immediately. The traffic policies initiated by the new management, do, however, tend to concentrate the flow of traffic over the line of the proprietary road. Even the most powerful shippers cannot retard the evolution of these forces; and when convinced of the superiority of service over the new route, will divert their business accordingly.

Outwardly, the traffic relations of the acquired road with its connections appear to remain unchanged. The rates are the same; the through rates are the same; the divisions remain unchanged. Apparently, the shipper's legal right to route his traffic remains undisturbed. He can, if he so chooses, send his traffic over any one of the numerous connections available. But sooner or later, the individual shipper will find it to his advantage to route over the road which has acquired the property to which he delivers his freight, and from which he receives it; the road which he must call upon for extra cars in time of emergency; the road which will spot his car just at that particular point on his private siding which will best facilitate his loading and unloading; the road to which he will be obliged to appeal for a new transit privilege to aid him in competing in far-off markets. The right to designate the routing, as the Interstate Commerce Commission stated recently, is exercised by the shipper only in exceptional cases, the matter of routes being subordinate to service.

The power of the originating road, in brief, to afford better service over its route and connections, than that afforded over any other, lies at the heart of these traffic diversions.

Aside from personal favoritism, railroad competition nowadays is almost entirely service competition. Now that the regulatory commission controls both minimum and maximum rates it is highly improbable that any serious rate competition could ever develop. The constituent elements of service competition have been well stated as follows:

> "(a) despatch, or time required for getting goods to destination; (b) safety of goods in transit; (c) promptness in settlement of claims, when lost or damaged, and absence of narrow technicalities in the process of adjusting claims; (d) frequency and reliability of the train service; (e) carrier's special equipment for handling such commodities as livestock and perishable articles; (f) carrier's special attention to certain types of traffic; (g) carrier's willingness to trace shipments or keep shipper informed of the movement of important shipments; (h) carrier's willingness to support shipper's desire for change in rates, rules, or classification; (i) situation of the carrier's line. to avoid congested districts, or to constitute an alternative route in times of traffic embargoes. Shippers also aim to favor with a long haul the carrier which does their intra plant switching."

Perhaps the most important aspect of railroad service is the time required to move a shipment from point of origin to point of destination. This is particularly so under modern conditions of distribution. Few merchants today buy in anticipation of future demand. They buy only as needed. They rush their orders from manufacturers. Expedited and efficient transportation service is imperative in such a scheme of distribution.

A Five-Road Route

The organization required to produce the required high class train service is extremely complex. It requires a superior degree of coordination between the lines that form the through route; between the originating road and the shipper; and between the delivering road and the consignee. The various details, particularly on preference service, the time of departure, the time of arrival, the exact hour of interchange with connections, the adjustment of switching service to train schedules, the nice observance of reconsignment instructions, etc., can be perfected only through long and continuous experience. A failure of one hour in a schedule can destroy entirely the usefulness of an established traffic route. A route composed of five roads—the Pittsburgh & Lake Erie, the Pittsburgh & West Virginia, the Wheeling & Lake Erie, the Northern Ohio, and the New York, Chicago & St. Louis—secures a substantial volume of business between Pittsburgh and St. Louis. It competes successfully with the Baltimore & Ohio, the Pennsylvania, the New York Central System, and a route composed of the Pittsburgh & Lake Erie, Pittsburgh & West Virginia, Wheeling & Lake Erie, and Wabash. The five line route affords a train service about thirteen hours quicker than its closest rival. It is fairly obvious, therefore, that all the five participating carriers must work harmoniously; or else they all lose the business. A delay in switching out a load at a small point in Ohio by the Wheeling & Lake Erie recently caused a delay of from 17 to 22 hours on a Pittsburgh-St. Louis shipment. As a consequence of the switching trouble, connections with the Northern Ohio were missed; and the latter in turn, missing connections with the New York, Chicago & St. Louis, was obliged to hold its train over all night.

This five line route, over which a large volume of

profitable traffic moves, can thus exist only if all the participating carriers work in close unison. If any consequential delay occurs, the route is impaired through the slowing up of train service. The traffic salesmen of the one-line route, which controls the shipment from origin to destination, will immediately solicit the shippers, and point out the disadvantages of a five line route dependent for its efficiency upon an absolute unity of harmony among five separate managements. They will contrast these conditions with the assurance of superior train service afforded by the one-line route of the Baltimore & Ohio, or the Pennsylvania, as the case may be.

The recent joint acquisition, subject to approval by the Interstate Commerce Commission, of the Wheeling & Lake Erie by the Baltimore & Ohio, the New York Central, and the New York, Chicago & St. Louis, has served to emphasize the bearing of train service upon railroad consolidation. The Pittsburgh & West Virginia is vitally interested in the perpetuation of the existing through route of which the Wheeling & Lake Erie is an essential unit. Indeed, a good part of its increasing prosperity is due to the business made possible by the formation of this route in 1923. In 1926, 70 per cent of the freight revenue of the Pittsburgh & West Virginia was derived from through business interchanged with the Wheeling & Lake Erie—business that was competitive with either the Baltimore & Ohio, New York Central, or Pennsylvania. It believes that part of this interchange will be lost if the trunk line control of the Wheeling be consummated. It is doubtful whether the trunk lines can formally destroy the through route, or cancel existing joint rates. The Interstate Commerce Commission may, as it has done frequently, condition its approval of the proposed acquisition upon the maintenance of present rates, divisions and service. But experience indicates that a regulatory body cannot act as a permanent detective organization to enforce with great punctilio an absolute equality of service by the Wheeling & Lake Erie with all its connections.

The Fight for Wheeling & Lake Erie

The Pittsburgh & West Virginia has, therefore, bought heavily into the Wheeling & Lake Erie, and it has paid a heavy price for the comparatively small interest it has obtained. It has made strong representations against the proposals of the trunk lines to hold directorships on the Wheeling & Lake Erie. It has even gone a step further and raised a question as far-reaching as any in the entire field of railroad consolidation. As a minority interest in the property, it has petitioned for approval to acquire a control under Section 2, paragraph 5. The Interstate Commerce Commission, in the proposed acquisition of the Missouri-Kansas-Texas by the Kansas City Southern raised the question of the legality of acquiring control of a carrier prior to its approval. Will it, on the other hand, give its approval to the acquisition of control of a road by another which has only a minority interest and under conditions which render it improbable that it can effect practical working control? This fundamental issue may be raised by the application of the Pittsburgh & West Virginia for permission to acquire control of the Wheeling & Lake Erie.

The former, in brief, is fearful that the trunk line ownership of the latter will result in a decided impairment of the standard of service over the Wheeling & Lake Erie. This will tend to destroy the efficiency of the present route of which the Pittsburgh & West Virginia, and the Wheeling & Lake Erie form an integral part.

Whether this result will follow is open to question. There may be countervailing considerations which may make such a course of action on the part of the trunk lines unwise. The maintenance and improvement of the high standard of the Wheeling & Lake Erie service would be good business if a contrary policy would result in the increase of the competitive strength of the Pennsylvania Railroad. But the important point to observe is that as owners of the acquired line they have the power—if they choose to exercise it—of slowing up its train service, so as to oblige the shippers in their own interests to forward their business over the proprietary lines.

Whether the trunk lines would in actual practice slow up the Wheeling service depends in part upon their competitive strength against the Pennsylvania Railroad. If they could successfully divert the traffic formerly moving over the Pittsburgh & West Virginia to their own lines, and thus obtain the revenue on the entire haul instead of on a portion of it, it would appear to be in their interest to do so. But they would obviously maintain the status quo, if the result of the contrary policy would be the diversion of the Pittsburgh & West Virginia traffic to the Pennsylvania Railroad. Hard-headed business strategy would decide the problem. The through trunk lines, however, control the situation. They can increase or decrease the standard of service over the originating road in accordance with their own business needs.

The standard of train service, in short, is an important consideration in determining the shipper's choice of routes. And the originating carrier, ordinarily, enjoys the power (and in the absence of any more powerful balancing considerations usually exercises it) of affording superior train service to those who ship via those lines and connections which yield it the best revenue.

Speed in the movement of trains does not spell the whole story of efficient railroad service. Elaborate terminal facilities must be provided to collect, distribute and warehouse freight. Team tracks, private tracks, and sidetracks; car floats and lighters; coal and iron ore docks; warehouses and elevators are only some of the many that may be mentioned. These are in almost all cases furnished by the originating carrier; and it usually invests large amounts of fixed capital in their provision. It is therefore not unreasonable to anticipate that it will exploit their use in the solicitation of traffic for movement over those routes which afford it the best revenue.

The schemes that may be adopted to enable the originating road to obtain the lion's share of the long haul traffic cannot be dogmatically classified. At almost every point in the rendition of modern railroad service opportunities exist. Switching regulations, transit services, reconsignment privileges, car supply provisions, are only some of the items that are used in pursuance of well-defined traffic policies initiated by originating carriers.

Dynamic Forces and the Consolidation Law

These traffic factors—the real, driving dynamic forces behind the consolidation movement—are not adequately reflected by the present law on consolidation. The Act of 1920 has set up a distinction between different forms

of corporate unions. It has distinguished mere acquisitions of partial control from complete unity of proprietary interests effected by the transfer of fee title to one company. Acquisitions so-called, involving control of one road by another through majority stock ownership, lease, or operating contract, can be approved by the Interstate Commerce Commission upon a finding of public interest. Complete mergers are at present illegal; they can be sanctioned only in the light of a complete and all-embracing plan for consolidation of all roads to be promulgated by the federal regulatory body. It was believed that an identity of interests achieved through lease or share control represented only a partial measure of ownership and that such temporary and incomplete unions should be permitted pending the determination of the ultimate destiny of the respective properties within the permanent grouping. It was assumed, apparently, that should the public interest, as viewed by the governmental body, require assignment of specific carriers to another grouping, it could be easily accomplished.

The merit of this distinction between complete consolidations and incomplete acquisitions is difficult to appreciate. There are, indeed, some advantages of mergers over acquisitions. Relatively minor economies may be realized. New capital can be borrowed on slightly better terms. The investment market, for example, has developed a strong prejudice in favor of obligations secured by fee mortgage. A first mortgage on property held in fee ownership represents an ideal which in the railroad field is rarely realized. Other conditions remaining equal, a bond thus secured commands a better price than one secured by a lien on a leasehold, or on shares representing voting control. Roads therefore go to great lengths to simplify their corporate structure. The extraordinary measures adopted by the New York Central in 1913, to acquire clear title to some of its subsidiaries in order to obtain an acceptable lien for its open mortgage about to be executed, furnishes an excellent example of the point in mind.

Through a complete consolidation, therefore, economies may be enjoyed which may not be available in an incomplete consolidation. That, however, is beside the point. The consideration of these angles misses the chief point in the consolidation movement. These are not the dynamic forces. It is probable that railroad executives would spend but a trifle of the time and energy required were those economies the only factors at stake. Prominent officials, such as Charles H. Markham of the Illinois Central, Robert S. Lovett of the Union Pacific, and others, have publicly stated that little economy could be expected from railroad consolidation. The late Senator Cummins, who devoted a good part of his life to the consideration of railroad problems, expressed similar views. He stated repeatedly that his chief interest in consolidation lay in the solution of the weak road problem—another illusion which has been blasted by the chill wind of continuous experience.

The railroads desire to acquire other properties because they want their traffic. If they can obtain this business at a low cost, through the inauguration of economies, so much the better. But it is the business they are after primarily; the economies will take care of themselves. The basic idea underlying the consolidation movement is, therefore, a traffic problem, not financial; not operating; and not one, directly and necessarily, calculated to preserve the so-called weak roads.

"Railroad Men Know What They Are About"

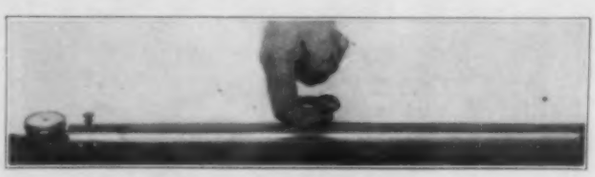
That railroad men know what they are about, that acquisitions of carriers—incomplete consolidations—permitted by law subject to governmental approval have been successful, and that acquiring roads have obtained increased business from acquired roads is evident from the experience of the past three years. It is difficult to measure accurately the scope of this traffic diversion, and it is equally difficult to differentiate that part of the increased traffic occasioned by normal growth of the territory served, from that occasioned by influences arising from the change in ownership of the acquired road. Publication of the traffic data necessary for an inquiry into this problem is not required by law and resort must be had to fugitive sources; primarily, although not exclusively, consisting of testimony taken, exhibits submitted, and briefs filed in formal acquisition cases before the Interstate Commerce Commission.

That traffic diversion from the acquired to the acquiring line does take place can be accepted as a truism. Every change in ownership necessarily and inevitably results in a realinement of traffic movements. This diversion takes place under the full sanction of the law. No routes, rates, nor divisions are changed; or, to put it more accurately, need be changed. The simple truth is that the route formed by and with the acquired and the acquiring line, affords superior service over any other, and therefore gets the business. The main issue, therefore, is simply this: the line originating traffic has it in its power, primarily through its ability to furnish high-class service, to obtain the controlling share of traffic for movement over that route which yields it the maximum haul, and the largest revenue. And roads acquire other properties largely in the anticipation of these results. The acquiring road full well realizes that eventually it will obtain the long haul and maximum revenue on the traffic of the acquired carrier.

It may be that complete merger may accentuate this process; that a system completely unified in ownership may obtain a greater share of traffic than one unified in operation and management only. Perhaps so, but, in any event, a sufficient volume of traffic can be diverted to make acquisitions, on fairly reasonable terms, highly profitable.

A Gage for Accurately Measuring Rail Batter

AN instrument for measuring accurately and quickly the amount of batter of rail ends has been developed by H. H. Morgan, manager of the rail and fastenings department of the Robert W. Hunt

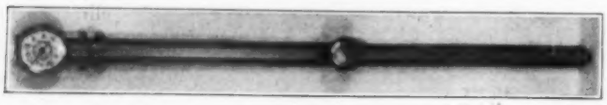


Side View of Hunt Rail Batter Gage

Company, Chicago. The device consists essentially of a steel straight edge, 18 in. long and ¾ in. wide on the base, with an automatic dial indicator showing vari-

ations to 1/1000 in. The dial is at one end of the straight edge and indicator is actuated by a metal point which rests upon the rail, following the top of the rail as the straight edge is moved along and thus, through the dial readings, providing a complete profile of the batter.

In operation, the gage is set on the top of the rail with the dial end toward the joint and about 6 in. from the end of the rail, and the dial is turned until the arrow indicator registers zero. The straight edge is then moved toward the joint, two pointed attachments on its side being ½ in. in advance of the dial indicator so that when these points reach the end of the rail the dial indicates the amount of batter at the distance from the end of the rail as specified by the manual of the A. R. E. A. After the batter of one rail has been measured the instrument can be lifted quickly and



The Dial Shows Variations to 1/1000 in.

swung around to be placed on the adjacent rail, a knob on the top of the straight edge facilitating this operation. The design of the straight edge provides rigidity and stability, with a weight which permits its convenient handling, and which also permits its being left on the top of the rail while the amount of batter is being recorded.

The Robert W. Hunt Company, in order to make this instrument available to the railroads at minimum cost, has arranged for its manufacture and sale by the Humboldt Manufacturing Company, Chicago, at a fixed price, with no royalty charge.

Freight Car Loading

WASHINGTON, D. C.

REVENUE freight car loading amounted to 1,003,292 cars during the week ended June 16, an increase of 7,332 cars as compared with the preceding week and a decrease of 13,187 and 33,351 cars respectively from the totals in the corresponding weeks of 1927 and 1926. Loading of ore, less-than-carload merchandise and miscellaneous freight was larger than a year ago and the decrease in the total as compared with the corresponding week of last year was largely due to a drop of 11,855 cars in coal loading. Loading in the Central Western and Southwestern districts was larger than a year ago. The summary, as compiled by the Car Service Division of the American Railway Association, follows:

Revenue Freight Car Loading

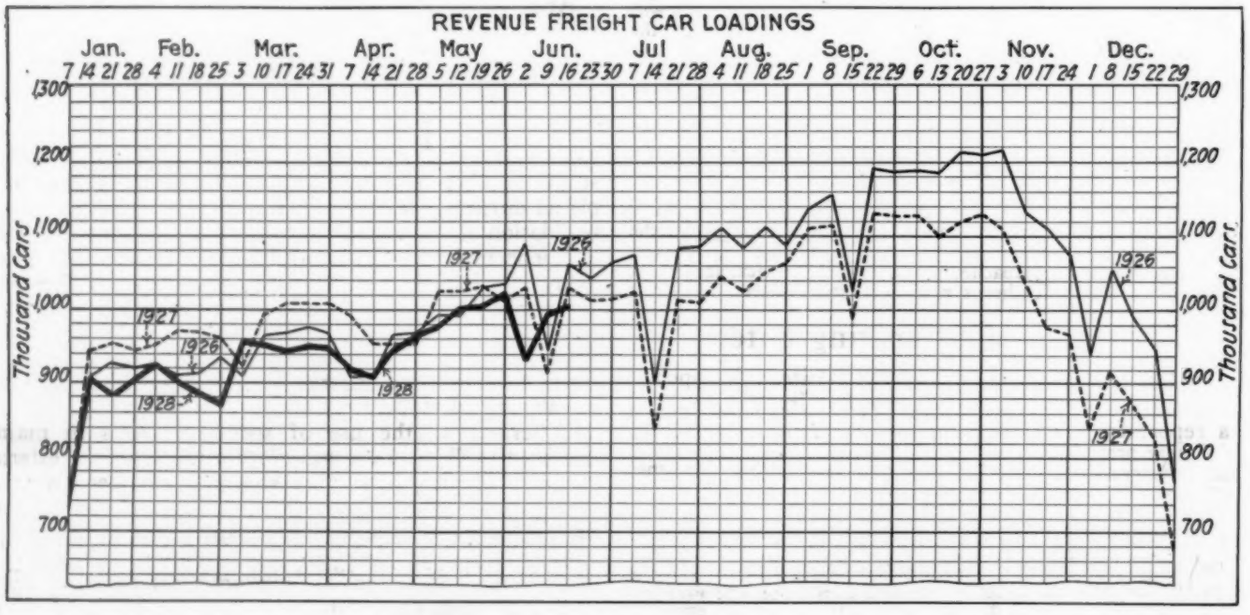
Week ended Saturday, June 16, 1928

Districts	1928	1927	1926
Eastern	230,923	235,707	242,469
Allegheny	206,934	208,247	213,286
Pocahontas	54,118	58,835	57,762
Southern	142,219	149,534	148,142
Northwestern	162,591	162,913	161,549
Central Western	136,444	133,020	139,980
Southwestern	70,063	68,223	73,455
Total Western Districts	369,098	364,156	374,984
Total All Roads	1,003,292	1,016,479	1,036,643
Commodities			
Grain and Grain Products	33,990	38,667	38,126
Live Stock	24,673	25,837	27,186
Coal	143,943	155,798	174,843
Coke	9,708	10,368	11,370
Forest Products	66,662	69,421	75,137
Ore	661,611	65,428	68,174
Merchandise L.C.L.	259,233	258,464	259,550
Miscellaneous	398,472	392,496	382,257
June 16	1,003,292	1,016,479	1,036,643
June 9	995,960	1,028,367	1,052,471
June 2	934,214	911,510	944,864
May 26	1,020,916	1,026,789	1,080,786
May 19	1,003,497	1,027,498	1,039,070
Cumulative total, 24 weeks	22,467,267	23,481,542	23,212,229

Canadian Car Loadings

Revenue car loadings at stations in Canada for the week ended June 16 totalled 68,405 cars, an increase over the previous week of 2,021 cars and an increase of 4,499 cars over the same week last year.

	Total Cars Loaded	Total Cars Rec'd from Connections
Totals for Canada		
June 16, 1928	68,405	37,031
June 9, 1928	66,384	37,247
June 2, 1928	69,334	37,311
June 18, 1927	63,906	37,425
Cumulative Totals for Canada		
June 16, 1928	1,528,511	954,949
June 18, 1927	1,453,243	931,637
June 19, 1926	1,364,827	898,006



Superintendents Consider Many Subjects

Operating practices, public relations and movement of trains by signal indication considered

Part II

THE volume of practical pertinent information presented at the twenty-fifth annual convention of the American Association of Railroad Superintendents was so great as to preclude the publication of all of it in one issue. The first installment was published, therefore, in the last issue, page 1429, and the remainder, including some of the most valuable papers and reports follows:

The Most Economical Train Load

The following report was rendered by a committee of which Victor Parvin, superintendent, Ann Arbor, Owosso, Mich., was chairman:

The most economical train load is the train load that will produce the greatest number of gross ton-miles per train hour and at the lowest unit cost. Two items determine whether the train load is economical or uneconomical—wages and fuel. Wages, being the greater of the two, should not be overlooked when trying to develop a larger output per 100 lb. of coal, otherwise the saving in fuel may in fact be an extravagant expenditure, while on the other hand too great a desire to decrease the crew cost is liable to cause an increase in fuel cost that will absorb the savings in wages.

Your committee does not believe that the economical train load can be developed by working locomotives to their maximum capacity, as developed by dynamometer cars, but that it is necessary to approach it from a different angle. We believe that with the present high wages, and time and one-half after eight hours, the economical train load is one that can be handled at a speed of 12½ to 15 miles an hour, but that this average should not be produced by a number of high speed or symbol trains offsetting the "drag trains," which are not nearly making 12½ miles per hour. Therefore, a railroad that is required to run a large proportion of high speed trains may make over 15 miles per hour and still be within the scope of "the most economical train load."

We recommend that after determining the train load that can be handled at the above speeds, the efforts of operating officers be directed to reducing delays and increasing tonnage. A careful study of the performance of individual roads will show clearly that when the train load is determined by the method herein suggested, the fuel performance will likewise be the best.

The local freight, which is looked upon as a "necessary evil," handling in many cases a most uneconomical train load, can be made less unprofitable, even with the present loss in local business, by shortening the run, and in many cases can be made profitable by handling tonnage in the direction of heavy traffic.

Your committee fully appreciates the fact that this is a problem local to each railroad and can only be left to the local officers to work out the solution. While some roads have more nearly approached their most economical train load than others, there is always room for improvement.

Methods of Promoting Safety

A committee, of which F. O. Whiteman, superintendent, St. Louis & Suburban was chairman, presented a report from which the following is abstracted:

Safety propaganda has reached into the innermost recesses of industry; yet injuries are occurring with greater frequency and greater severity than should be expected after so many years of effort to educate employees as to their safe conduct. It is the primary duty of superintendents to go deeper into the question of enforcing rules governing safety. It may be said that every rule in the operating department rule book is a safety rule. To get a strict enforcement of these rules, some measure of discipline will have to be meted out to the employee for his infraction of the rules, or his carelessness that produced the injury.

This discipline should be educational to all employees. It may range from admonition to dismissal. Very definite rules are laid down for the conduct of employees in various lines of employment, and if the superintendent will investigate every injury occurring under his jurisdiction, he will discover that not less than 90 per cent of them are caused by rule violations, recklessness and unwarranted chance-taking. Discipline should not always be administered to the injured employee, for it may be found that the immediate supervisor of the injured employee had never taken the pains to instruct the employee properly in the manner that his work should be performed; or, if the employee did the work improperly or violated a rule, he did not correct him at the time and set him right in the manner in which he should proceed. In such cases the supervisor should be corrected, rather than the injured employee.

Safety is an inherent trait in the human mind. It needs only proper knowledge, training and development—which is called education—to stimulate those instincts which make for safety. We need training even more than mere knowledge. To survive, we must do the safe things instinctively at the critical moment. We must understand that education along safety lines must start at the top. The responsibility rests with the immediate supervisor to know that his men who are performing the work will do so with safety always in mind.

Our employees should be as much interested in the safe operation of the railroad as anyone else. While we must never forget that the safety movement is primarily a humanitarian movement, we cannot overlook the fact that it has a very great economic bearing upon the finances of our railroads, and every dollar that is spent in the adjustment of claims growing out of personal injuries must be absorbed in our operating expenses. When large amounts are thus charged against a division, that officer is confronted with the necessity of curtailing his expenses somewhere—most frequently in the reduction of working forces. There is where the men themselves are economically interested, because they may be the victims of the curtailment of expenses.

Report on Operating Practices

After reviewing its work in recent years, the committee, of which C. A. Mitchell, superintendent, N. Y., N. H. & H., Hartford, Conn., was chairman, presented a report dealing briefly with automatic signals, spring switches and remote control switch operation as operating facilities.

In signaling, after giving the mileage of automatic signaling and the number of interlocking plants completed during 1927 and under construction and in contemplation at the end of the year, the committee pointed to the completion of 6 car retarder installations last year, bringing the total to 15 and quoted a statement from a financial paper to the effect that the saving effected by one of these installations in the way of direct reductions in operating expense and in expedited movement of traffic will almost equal 80 cents a share on that road's capital stock.

Referring to the use of spring switches in main tracks, the illustration was cited on one northwestern railroad where three spring switches, installed on one division in the latter part of 1926, have resulted in an annual saving of over five thousand dollars. Prior to the installation of these switches, crossovers were operated by three towermen from an interlocking plant. The spring switches were installed at each end of a passenger

crossover, and at the yard end of the freight crossover. The interlocking plant was abandoned and the towermen dispensed with. The crossovers are protected by automatic block signals. During the months of November and December, the heaviest snowfall in 54 years caused no difficulty with the spring switches. The speed of all trains is restricted to 15 miles per hour through the switches and there have been no derailments or failures of the spring switches to operate properly.

The Committee on Economics of Railway Signaling of the Signal Section, A.R.A. has been making a survey to determine the economic value of remote power switch machines to (a) eliminate train stops to throw switches and (b) consolidate interlocking plants and thereby save wages.

An inquiry was sent out to 78 Class I roads and answers have been received from 71. Thirty-six of the roads reported the use of remote power switch machines. The committee is now analyzing and tabulating the information given in the answers, and furnished the committee of the Superintendents' Association with the following summary:

Number of roads reporting the installation of remote power switch machines during 1922-26	34
Number of installations installed since 1921	193
Number of switch machines installed	310
Cost of installations (this includes 148 of the 193 installations, detailed information for 45 installations not being available)	$1,431,572
Annual charges, maintenance, operation and interest (annual charges at 22 per cent of first cost)	$314,425
Gross value of savings per year for 148 installations:	
(a) Savings due to the elimination of train stops.	
Number of train stops eliminated per year	379,527
Train hours saved per year	61,033*
Overtime crew hours saved per year	$269,158
Coal saved per year	$456,706
Total gross savings due to the elimination of train stops	$725,864
(b) Savings due to release of interlocking operators. Wages saved per year	$170,793
Total gross savings	$896,657
Deduct annual charges	314,425
Net value of savings per year for 148 installations	$585,232
Return on investment	40.7 per cent

* This is equivalent to one train standing still for nearly seven years.

This report was followed by a paper presented by O. R. Teague, division superintendent, S. A. L., Savannah, Ga., describing the economies effected and the improvement in train operation resulting by reason of the installation of automatic signals between Richmond, Va., and Hamlet, N. C., which paper was published in substance in the *Railway Age* of July 16, 1927, page 91.

Following this paper, S. H. Shults, chief train rules examiner, C. B. & Q., described the extensive investigations which that road has made of various suggestions to facilitate the movement of trains, which have led to the very general substitution of the No. 19 for the No. 31 form of train order; the operation of as many as 51 passenger and 22 freight trains in each direction in a day on a three-track line between Chicago and Aurora, Ill., a distance of 37 miles by either-direction signaling; the installation of 12 spring switches and the removal of operators at the ends of double track; and the concentration of the control of junction switches with the dispatcher at West Quincy, Mo., eliminating 12 operators. (See *Railway Age* of March 24, 1928, page 677.)

Relations Between Railroads and Shippers

A committee, of which F. O. Coleman, superintendent, Minneapolis & St. Louis, Oskaloosa, Iowa, was chairman, reported on the public relations work of a superintendent and also on ways of increasing car loading. That portion of the report on the first subject follows in part:

Great strides have been made during recent years in closing the gap between the railroads and the shippers, but there yet remains a big opportunity for further activity in this regard.

It is, of course, essential that the various departments of the railways work together in the promotion of public relations. Therefore, it is necessary that the officers, first of all, actually practice whatever doctrine they approve in this connection. They should instill into the minds of the employees the importance of courtesy and its effect on people in other walks of life with whom they may come in contact. The superintendent should, whenever possible, mingle with patrons, as well as chambers of commerce, boards of trade, clubs and municipal bodies on his division. We find by experience that when this is done, a friendly feeling results.

The personal contact of the rank and file with the public, however, will have a lasting and valuable effect, as it is indicative of the spirit that permeates the entire railway organization, and it is this understanding and belief that, when once impressed on the public mind, will give to the railroads their just consideration, and so affect the shippers and railroads as to provide the same considerate relations as now exist between the public and other great corporations.

It is our opinion that the friendship of some of the larger industrial and commercial districts can best be cultivated by producing the best of service and by yardmasters, switchmen, car clerks and other terminal employees being tactful and efficient in serving these patrons. When a shipper wants some unusual service that is consistent, give it to him without quibbling. Also be reasonable on bills for side track repairs, etc., and not technical or evasive in making settlements. Refrain from taking sides when industries become involved in controversies that do not directly interest the railroad. We believe that busy industrial establishments can be called on too frequently by railway representatives, and that a greater degree of friendship can be gained by giving the very best service and attending promptly to shipper s, requests, and requirements in connection with the favorable progress of their business. If dependable and courteous service is rendered, the relations with the shippers will be good.

To many people a railroad simply means tracks, cars and locomotives and a station. The great shops, repair yards and tracks, storehouses and other units of manufacture of the equipment and construction are not, as a general rule, within their knowledge. These facts should be brought to them in some manner. We believe it would be well to arrange for various civic bodies to visit the railroad plant, or at least some of the departments, so that they may see what is necessary to be done before trains can be run, what must be done to keep them running, and that they may realize and appreciate the great army of men and women necessary to operate a railroad.

Good service makes for favorable public relations to a certain extent. However, service does not only require good movement of freight, passengers, mail, express, etc., but also kindly and friendly contact with patrons and the public as a whole. A station agent can do great harm to a railroad by his failure to use diplomacy and work to the interest of the public so far as he consistently can in his particular community. His duties are many, especially if he is in charge of a big station with an office force to supervise. He is referred to by the public as the "railroad" in his community, and he is truly the railroad's most important representative in the eyes of the public. He is called upon to answer many questions daily, to deal with many people of various temperaments and to handle the situation without antagonism and shortcomings in the eyes of the public. This is a meritorious accomplishment; however, it can be done, and is done in many cases. Where this practice prevails we usually find a high degree of co-operation and friendly relations between the railroads and the public.

We are all familiar with the great work that is being accomplished by the regional advisory boards in the promotion of public relations between railroads and shippers, but there is a great field that the advisory boards cannot reach. We have in mind the local fields of individual railroads. We feel that these fields should and can be reached by division officers through direct contact with the public and through the employees of all departments. The employees must have faith and confidence in the railroad by which they are employed, and this faith can be created and their confidence can be energized by proper contact with the officers.

Increasing Net Tons Per Car

This committee also presented a report on increasing the average net ton per car, which is abstracted below:

Since 1923 there has been a progressive increase in the size of new freight cars. All along it has been foreseen by most people that a limit would come in this direction. In recent computations of car supply the measure employed has been the total number of capacity tons of all cars. This has been criticized, we now think, soundly. We believe that we must recognize the fact that in a fuller sense than has been appreciated heretofore "a car is a car." Certainly large cars will do no more work than smaller cars if they carry no larger loads. As was set forth in the May report of the Car Service Division, the average loading per car has been disappointing. The high point was reached in 1920 when cars averaged 29.3 tons. In 1921 the figure dropped to 27.6, in 1922 to 26.9, and while it rose again in 1923 to 27.9, it has never again reached 28.0, and for the first nine months of 1927 was 27.3. Doubtless in a time of extreme congestion many of the roads which under ordinary conditions maintain less-than-carload merchandise service, will transfer this scantily-filled quota of their rolling stock to traffic, in which cars can be more fully loaded. Aside from this, the trend of average loadings per car has not been such as to indicate that cars of the larger sizes will actually haul freight in quantities proportionate to their capacity.

We are satisfied that in many instances 80,000-lb. capacity cars or larger are ordered, when, as a matter of fact, 60,000-lb. capacity cars would serve the purpose. It is assumed by many shippers that 60,000-lb. capacity cars are passe, when, as a matter of fact, they are, with proper repairs, just as good for certain commodities as cars of greater capacity.

It is a practice, in some cases, for agents to load a few pieces of freight in a car at intermediate points, regardless of capacity, to avoid the necessity of the local crew loading the freight from the station platform or platform truck, which in many instances could be done in less time than that consumed in picking up the car from an industry track. This practice can be eliminated by division officers checking merchandise tonnage picked up in carload lots at intermediate points.

Local freight conductors can also assist in increasing the average net tons per car by supervising closely the loading of freight enroute and seeing that no more cars are used than are absolutely necessary. The failure of a local freight crew to make a proper spot of merchandise cars at a platform when making a station stop sometimes results in loading freight in the car nearest at hand to avoid the second spot, especially if it is a long train. This practice not only reduces the average net tons per car, but also increases the volume of switching at a busy terminal, and in many cases causes more or less congestion at the freighthouse and consequently increases the work of the freighthouse force. The delay to a car unnecessarily loaded with freight is also a factor that should be taken into consideration, especially if it is a foreign car.

Considerable improvement can also be made in loading cars at freighthouses, especially at large terminals or centers where a considerable amount of freight is handled. A close check of the "tons per car" should be kept by the agent and freighthouse foreman in charge. Of course, it is seldom that a car can be loaded to capacity with merchandise, but it is not infrequent occurrence for a certain line-schedule car to run exceedingly low on the average daily loading. When this occurs, it is frequently possible to consolidate such a line-schedule with another line-schedule over the same territory. Persons in charge of freighthouses should also keep a record of the tons per merchandise car received, for the purpose of ascertaining whether cars are being received containing small lots of merchandise that could be consolidated in other cars at point of origin. When discrepancies are discovered, the loading agent or conductor should be notified and the matter called to his attention for correction. Division officers and yardmasters can, by frequent observance and check, regulate such loading.

Discussion

By vote of the association this report was referred to the American Railway Association with the suggestion that copies be sent to the regional advisory boards.

Handling Traffic With the Container Car System

By G. H. Wilson

Superintendent, New York Central lines, New York

The first cars for express service carried nine containers or large steel boxes locked firmly inside of heavy steel uprights, each container being removable by a crane for transport by motor trucks to and from the stores, warehouse or factory of the consignee. In appearance, the loaded steel side board flat car looks like a solid load of safes or steel vaults 6 ft. by 9 ft. each, set aboard a special underframe with low protecting steel sides. The freight type of container car is similar to the express type but provides for the use of three 15-ft. containers on a shorter car.

The portable containers are loaded and locked at the shipper's store or warehouse, conveyed by motor truck to the railroad yard and there lifted by crane aboard the car. The steel sides of the car afford absolute protection against the opening of the container doors in transit. At destination, the locked container is transported by motor truck directly to the consignee's door. Thus, all the handling and checking process between shipper and consignee is eliminated with a saving in labor and time. Obviously, the prompt handling of the containers greatly increases the car mileage. As all containers, each in its class, are of standard size, a few extra sets means that cars in busy times need not wait for particular containers but may be loaded with the first offered and keep moving.

Much expense is eliminated for crating and boxing. The express car is 63 ft. long and is passenger-truck equipped. Each container is 9 ft. wide by 6 ft. long, with an inside clear height of 7 ft. 4 in., and a door 3 ft. by 6 ft. They have a carrying capacity up to three tons each. They are as near burglar and fireproof as it is possible to make them and are water tight. They have special attachments for convenient lifting and handling with the crane. The length (inside measurement) of the freight container car carrying the three 15-ft. containers is 46 ft. and 50 ft. over all.

The brick container car, with twelve containers, soon followed and quickly came to the front as a very economical method of handling that commodity. These cars are also assigned to the crushed stone, sand and gravel trade.

At the time these types of cars were introduced, it was found expedient to organize a small car distributing force in the office of the assistant freight traffic manager in New York, to apportion the cars between the many shippers, according to the volume of business offered by each concern, in order to prevent detention to cars under load and give each shipper a sufficient number of cars to take care of his business properly. To illustrate; there are more than 20 large and several small brick yards along the Hudson river between New York and Albany, that heretofore shipped about 90 per cent of their brick in barges to the New York market, involving manual handling from yards to barges, thence to docks and from docks to trucks for delivery at building operations. All these yards have in the past five or six years greatly increased their output and the container cars now handle about 90 per cent of it. The brick yards have private sidings on which the containers are loaded with mechanical conveyors, and the container cars move in regular symbol trains every night for the next day's delivery. At destination, the cars are placed on tracks spanned by moving electric cranes (generally of 10-ton capacity) which pick up the containers and empty the brick into dump trucks. Each container has a capacity for 3,000 bricks and each car holds 12 containers, or a total of 36,000 bricks per car. It requires less than two minutes from the time the crane starts to make the "hitch" until the empty container is again back on the car. At one station there are three parallel tracks with a total capacity of 38 cars, served by two cranes and with the second set up, 76 cars per day are handled, or 2,736,000 bricks. There are six such delivery stations at convenient locations in greater New York and others are being established in suburban territory. The empty cars are returned every night by designated trains to their proper stations, where the same cars are again loaded. The breakage of brick in this handling is fully 30 per cent less than by the old method of many manual handlings. While the rail rates are fair to the roads, the shippers get the brick to the consumer at less cost than by the old cumbersome method.

The merchandise containers are operated in several ways, but principally by large shippers from their places of business in containers on auto trucks to freight yards, thence by train to destination, where they are met by auto trucks which take the containers to consignees.

The fastest growing method, however, is the use that trucking and forwarding companies are making of them by collecting many l. c. l. shipments in the various cities and combining them into carload lots for shipment to distant points, where they either have their own trucks or working agreements with local truckmen, who meet the cars and deliver the separate shipments to consignees from the containers.

The economical feature can readily be seen when one realizes the saving in freighthouse labor and the simplified billing of carloads, instead of items. Long distance automobile trucking also becomes more economical and speedier when "bridged" by container cars in this way. The expansion of this method of transportation seems to be a fertile field for both traffic and operating officers.

Your attention is called to articles in the Motor Transport section of the *Railway Age* of February 25, 1928, and March 24, 1928, written by President William T. Hoops, of the L. C. L. Corporation.

Report on Operation of Trains By Signal Indication

A committee, of which H. F. Milligan, superintendent of the Big Four, Mattoon, Ill., was chairman, presented a report on the operation of trains by signal indication. In presenting the report Mr. Milligan gave a brief history of the development of the practice of operating trains by signal indication, with a summary of several papers presented before the Signal Section, A. R. A., at its convention in March, 1925, and published in the *Railway Age* for March 21, 1925, page 785.

Adding to this information Mr. Milligan stated that on the St. Louis division of the Big Four, from Indianapolis to St. Louis, there is single track between Terre Haute, Ind., and Pana, Ill., a distance of 90 miles. In 1925 the management seriously considered double-tracking this section but it was found that by installing signals on the single track and operating all outlying switches by remote control 15 per cent increase over any previous peak business could be handled on this division. In all probability, this will postpone the double-tracking of this line for 10 years. The signals and remote control switches will be completed within the near future, and at this time it is proposed to handle trains on the single track by signal indication exclusively. At present, 8 fast passenger trains and 2 local passenger trains, 6 fast freight trains, 3 local freight trains and a number of extra freight trains are being operated in each direction daily, or approximately 40 trains in the 24-hour period. From checks made it has been found that at fully 62 per cent of the meeting points on the single track where remote control switches have been installed, neither train stops.

The operation of trains by signals was considered to be of such importance that the committee arranged for the presentation of papers and moving pictures of recent installations as a part of the report.

The Centralized Dispatching System

J. J. Brinkworth, superintendent of the Ohio division of the New York Central, presented a paper describing the benefits of operating trains by signal indication on 40 miles of single track from Stanley, Ohio, to Berwick, where the centralized dispatching system has been in service since July 25, 1927. This installation was described in an article in the *Railway Age* of August 20, 1927, page 325. In addition to giving a general description of the system and method of operation, Mr. Brinkworth explained some of the benefits as follows:

In 1911, a joint trackage agreement was entered into between the New York Central and the Big Four, covering the operation of the road between Berwick and Toledo, since which time the traffic has continued to increase from year to year until in 1925 and 1926 the railroad was confronted with the evidence that additional facilities had to be provided. Consideration was first given to the question of double tracking the line, which involved an expense probably running into two or more million dollars. In order to avoid this heavy capital expenditure, various other methods of taking care of the increase in traffic were given consideration which finally resulted in a decision to install the centralized signal dispatching system of the General Railway Signal Company. At the time this decision was made we were handling a traffic of 40 or more trains per day and issuing about 125 to 150 train orders daily. You can appreciate the real problem of handling this volume of traffic on a single track railroad, with the difficulties incident to train orders, handling 12 first-class passenger trains, making meets, stopping heavy tonnage freight trains with consequent delay, etc. Immediately after the installation was placed in service we were able to dispense with the services of 15 operators at a saving of approximately $25,000 per year.

For many years we have included in single track operation as unavoidable delays: Train stops incident to pulling in and out of sidings; delays incident to meeting trains; delays clearing passenger trains, etc. Perhaps in years gone by, with trains of 20 to 30 cars, these train stops did not mean so much, but under present operation, with heavy power and long trains, in some cases of 10,000 adjusted tons, which we operate frequently in this territory, it must be realized that to stop such a train is a costly operation. It is conservatively estimated that train stops cost somewhere from $3 to $5 per stop, depending, of course, on the size and weight of train.

The new system changes this picture entirely; the train dispatcher is relieved of the heavy burden of issuing train orders constantly; the train crews operate entirely on signal indication; the unavoidable delays, so-called, are almost entirely eliminated and we see the picture of long, heavy tonnage freight trains entering and leaving sidings without stopping. An actual check-up of operation in the past few months developed that 50 to 70 per cent of the meets were made without either train stopping.

The traffic in the territory in question has fallen off materially since the installation, which does not enable us to give a full report on the effect of the installation, but our experience with the system in the past 10 months has proved conclusively that it is practical, speeds up train operation, avoids stops of heavy freight trains to throw switches by hand, permits many non-stop meets of both passenger and freight trains, and increases the gross ton miles per train hour, which, of course, brings about an increase in the efficiency of train operation.

The Missouri Pacific Installation Reduces Stops

T. W. Cheatham, division superintendent of the Missouri Pacific at Osawatomie, Kan., presented a description of the operation of trains by signal indication on 50 miles of single track from Leeds, Mo., to Osawatomie, Kan. This installation was described in an article in the *Railway Age* of November 8, 1924; while the results of the operation in reducing the running time were set forth in an article on page 1,133 of that publication for December 19, 1925. Furthermore, a paper presented by Mr. Cheatham before the convention of the Signal Section, A.R.A., was published in the *Railway Age* of March 9, 1926, page 632.

In addition to the information contained in these articles, Mr. Cheatham explained to the convention, several advantages that have developed more recently as follows:

When the installation was first placed in service, in order to prevent overloading the new method of operation and owing to the fact that the controlled manual block was superimposed on the original manual telephone block, the nine existing continuous service telegraph offices and one new office to relieve the relay office at Osawatomie were connected to handle the work. Later, as the men became more accustomed to its use, it became possible to drop three of the offices and relieve the relay oprators at the terminal at Osawatomie of this part of the work without reducing the operating efficiency of the district. This resulted in a reduction of eight men and has added materially to the yearly savings brought about by this new method.

Approximately 50 per cent of all meets are made without either train stopping. This applies whether two freight trains, two passenger trains or a freight and a passenger train are involved, where there are lap switches or at intermediate sidings where the switches are power-operated.

The advantages of moving trains by signal indication on this territory are demonstrated daily. In many instances before the train has stopped, meeting points are changed after a train has entered a siding by opening the switch and clearing the signal at the far end of the siding. This is done without any delay to the train. Signalmen, noting defective equipment as a train passed their station, have set the signal ahead of the train at stop, and reported the defect by telephone to the train crew, thus probably preventing an expensive accident.

The freight train speed on this territory has increased 50 per cent over the old method of operation. Comparing the three heavy traffic months in 1924 as against those in 1927, shows that the speed increased from 9.24 m.p.h. to 13.52 m.p.h. The average train load of all trains has increased from

1,978 in 1924 to 2,281 in 1927, or 15.3 per cent while the coal consumption per 1,000 gross ton miles for the same period decreased from 183.8 to 150.3 or 22.2 per cent.

Central of Georgia Installation

Henry Baldwin, superintendent, Central of Georgia, Macon, Ga., presented a paper prepared by E. B. DeMeritt, signal engineer of this road, explaining the results obtained by a special signal arrangement to handle trains by signal indications without train orders on 29 miles of single track from Macon, Ga., to Fort Valley. This paper was published in the *Railway Age* of March 6, 1928, page 560-D-6, and a description of this installation was published in the *Railway Age* of June 18, 1927, page 1935.

Signaling on the Arkansas Division, Missouri Pacific

A. R. Taylor, division superintendent of the Missouri Pacific at Little Rock, Ark., presented a brief description of the benefits derived from the installation of automatic signals on the Arkansas division in the last few years. An abstract of this paper follows:

The first signal installation on the division was made during 1923 on 3.5 miles of double track through North Little Rock yard. In 1926 an extensive program of signaling was started and on May 5, this year, signaling was completed on the entire line from St. Louis, Mo., to Texarkana, Ark.

The Arkansas division comprises the following mileage:

Poplar Bluff, Mo., to Texarkana, Ark.	324.74 miles
Benton, Ark., to Hot Springs	30.87 miles
Total	355.61 miles

of which there is double-track:

Poplar Bluff to Harviell	7.61 miles
Diaz, Ark., to "A" Tower	4.16 miles
Bald Knob to North Little Rock	56.47 miles
Little Rock to Benton	24.51 miles
R. O. Junction to Bierne	7.04 miles
Clear Lake Jct. to Texarkana	9.86 miles
Total	113.35 miles

Prior to March 1, 1927, the northerly limits of Arkansas Division terminated at Hoxie, Ark., 116 miles from North Little Rock, and on that date it was extended to Poplar Bluff, Mo., a distance of 63 miles, Hoxie being abandoned as a freight terminal.

Freight Train Districts

Hoxie District—Popular Bluff to North Little Rock ..... 178.69 miles
Little Rock District—Little Rock to Texarkana 146.05 miles

Average Passenger Train Movements During 24-Hour Period

	Miles	No. Trains
Poplar Bluff to Bald Knob	123	16
Bald Knob to Little Rock	57	22
Little Rock to Benton	23	24
Benton to Texarkana	122	16
Benton to Hot Springs	31	12

Average Freight Train Movements During 24-Hour Period

	Miles	No. Trains
Poplar Bluff to Newport	97	16
Newport to Bald Knob	24	20
Bald Knob to North Little Rock	56	22
North Little Rock to Benton	24	24
Benton to Gurdon	58	22
Gurdon to Texarkana	64	20
Benton to Hot Springs	31	2

Conventional absolute permissive block signaling, with such changes as were required to meet our local operating conditions, has been used on all of the single track. On the double track from Bald Knob to Little Rock, Little Rock to Benton and Clear Lake Junction to Texarkana, head-block signals are so arranged that trains may be crossed over to the opposite track through inside sidings and at crossovers. In order to cross over for an "against current of traffic" movement, a clockwork time release has been provided, which is located in the telephone booth. This release is operated by the telegraph operators at open offices, and by trainmen at "blind" sidings. When the release is operated, all opposing signals in the block in advance, if not occupied, assume the "stop" position, and a "clear" indication is given to the train desiring to make the move. After this train has crossed over and entered the block, it clears automatically "against current of traffic" signals in the blocks ahead as it advances, provided, of course, the block is not occupied. "Against current of traffic" movements in this territory are made on authority by train order as the blocks are from station to station, no intermediate signals being provided. The signals, however, are so located that when traffic justifies, future installations can be made to permit of operation by signal indication without train orders.

We have gone still further on the double track from Walnut Ridge, Ark., to Hoxie Yard, 4.16 miles, and from RO Junction to Bierne, Ark., 7.04 miles, where we have provided No. 20 turnout switches at each end of double track, which are remotely controlled by operators, and completely signaled for operation in either direction by signal indication, without train orders.

The average cost of maintenance per mile of single track signaling is $14 per month, which includes the cost of electric current. The economy effected by the signal installation yields a return of approximately 15.5 per cent on the investment, which we consider fully justifies the expenditure, without taking into consideration the added protection and safety afforded in the operation of the division.

A Study of Dispatcher Control on Southern Pacific

P. Slater, supervisor wages schedules, Southern Pacific, presented the results of a detailed study to determine the possibilities of the dispatcher controlled signal system on certain lines of the Southern Pacific, in the course of which a formula was developed to determine the number of trains to be handled and this was then checked by observing actual train operation. The derivation of this formula, including logarithmical calculations, is omitted here, but an abstract of the paper giving the results of the dispatcher-controlled system on a proposed installation is given below.

A theoretical study of the possibilities of the dispatcher control system compared with the train order system, covering a section of single track of approximately 38 miles, containing 11 passing tracks developed the following:

The dispatcher-controlled system of operation is a means of increasing the capacity of a single track line and thus postponing the time when the more costly relief, represented by double track, is made necessary. Operating savings may be found to cover the added carrying charge represented by the installation, but in order to amortize the investment it is necessary to take credit for the avoided losses, due to double track, during the life of the temporary dispatcher system. The increased capacity is determined from considerations of the peak load, and the operating economies from consideration of the daily load throughout the year.

It may be proven that, if all trains travel at a uniform rate and are dispatched at uniform intervals, the number of meets in one day's run will equal the number of trains squared divided by four; and for any section of the track, therefore, the meets will be proportional to the square of the number of trains. To test the accuracy of these formulae the total hours required and time saved were computed for each of the 12 test days

Table I—Application of Formulae Compared with Actual Conditions on Test Days

Test Days	No. of Freight Trains (a)	Train Order Operation Total Freight Train Hours: By Train Sheets (b)	Train Order Operation Total Freight Train Hours: By Formula (c)	Dispatcher Control Total Freight Train Hours: By Train Sheets (d)	Dispatcher Control Total Freight Train Hours: By Formula (e)	Stops Saved by Dispatcher Control: By Train Sheets (f)	Stops Saved by Dispatcher Control: By Formula (g)
First	11.4	26.72	28.7	24.47	26.8	16	21
Second	15.0	52.45	41.7	44.57	37.0	38	32
Third	13.6	36.50	36.4	33.00	33.2	38	28
Fourth	26.0	79.13	97.9	67.55	80.0	54	72
Fifth	24.6	84.87	89.2	72.61	73.2	52	67
Sixth	26.1	114.03	98.5	85.98	80.2	100	73
Seventh	29.6	115.03	122.5	97.70	97.2	83	87
Eighth	26.8	90.62	103.0	74.75	83.6	61	76
Ninth	29.0	109.42	118.1	84.00	94.0	99	86
Tenth	29.6	153.85	122.5	109.22	97.2	88	88
Eleventh	30.8	133.12	131.4	114.43	103.6	84	92
Twelfth	27.6	101.88	108.4	87.35	87.2	71	79
Totals	.....	1097.62	1098.30	895.63	893.2	784	801

and tabulated in columns "c" and "e" in Table I. The totals found are:

	Actual	Theoretical
Total hours—train orders	1097.6	1098.3
Total hours—dispatcher control	895.6	893.2
Train hours saved	202.0	205.1

showing a close agreement. The first nine observations were made by a representative of the Union Switch & Signal Co. The last three observations were made by our statistician and showed the following comparison:

	Actual	Theoretical
Total hours—under train orders	388.9	362.3
Total hours—under dispatcher control	311.0	288.0
	77.9	74.3

These figures are above the theoretical average because of the arrival on the district, on the eleventh test day, of a fleet of five freight trains which had to yield to a silk train following close behind. Barring this exception there is a close agreement in the results by this office compared with the results by the signal company's representative.

The maximum number of trains that may be dispatched economically over a single track section at the same time is equal to the number of stretches between passing tracks. For continuous occupation this would represent 12 × 24 = 288 train hours per day. But it is not feasible to spread the traffic uniformly over the 24-hr. period, since the trains must be dispatched as they arrive at each end of the district. An analysis of three peak days indicates a load factor of 62 per cent; that is, the average use was only 62 per cent of the maximum demand. Sixty-two per cent of 288 = 178 train hours; deducting 11 hours for passenger trains leaves 167 hours, which is the average use during a peak day.

The test period developed that the congested or exceptional days varied from the average as follows:

Under train orders..... 30 per cent
Under dispatcher control..... 22 per cent

which means that the average occupation that may safely be assumed is:

Under train orders..... 167 ÷ 1.30 = 128 train hours
Under dispatcher control 167 ÷ 1.22 = 137 train hours

A chart showing the theoretical curve of average train hours for various track density, indicates the number of trains occupying the track for the above hours to be as follows:

Under train orders..... 30 trains
Under dispatcher control..... 37 trains

which represent 23 per cent increase in capacity.

The time which double tracking may be postponed is determined by the additional capacity provided, divided by the annual growth. The following figures show the growth of freight traffic:

	Gross Tons (Thousands)	Per cent
1st Year	10,945	100.0
2nd "	10,939	100.0
3rd "	11,441	104.5
4th "	14,211	129.8
5th "	11,240	102.7
6th "	11,502	105.1
7th "	14,044	128.3
8th "	14,527	132.7
9th "	14,603	133.4
10th "	14,815	135.3
11th "	15,594	142.5

This is an average rate of 4.2 per cent or 465,000 gross tons per annum during the last ten years. The 23 per cent increased capacity by dispatcher control will take care of 5.5 years more.

The operating economies result from savings in train hours and in the stopping and starting of trains. The average train hours required under each operation, as developed above, and the number of freight trains on each day from October of the tenth year to September of the eleventh year, were used to develop the annual train hours saved. The actual freight trains during this period are approximately 10 per cent more numerous than the equivalent through freight trains and therefore allow for the average traffic during the life of the installation. The annual savings thus estimated amounted to 3,123 freight train hours.

Under the train order system the freight trains taking the siding must first stop and throw the switch; whereas under dispatcher control the switches are lined by the dispatcher and one stop is saved. The test period developed that the stop saved may be expressed by the following formula:

$$S = 0.06\ N\ 1.47$$

where S = stops saved and N = number of freight trains per day. The application of this formula to the number of freight trains during each day amounts to 10,153 stops saved.

During the test days each run was noted as to the amount of overtime made. To the extent that overtime was made on the trip the saving was taken as overtime. During light traffic periods the percentage of trips running into overtime was small and increased as the density increased. It was found that the percentage varied from 10 to 46. A graduated ratio resulted in a saving of 1,120 hours at the overtime rate.

In Appendix "A," the above savings are priced out and compared with a parallel estimate under double track operation. This estimate shows:

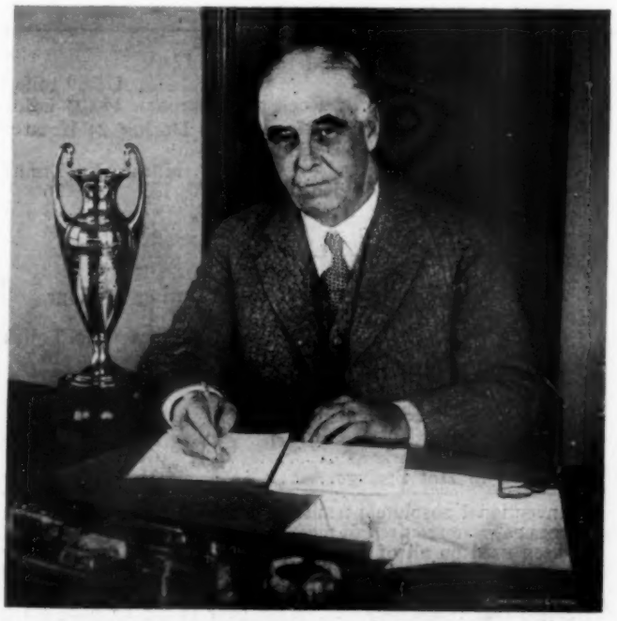
Annual loss, including carrying charge under double track operation	$ 81,500
Carrying charge and amortization of net investment cost of dispatcher control installation in 5.5 years	68,230
Carrying charge on salvage value at 5½ per cent	6,800
Operating savings under dispatcher control, annual	39,130
Making a Gross Saving:	
Including amortization charge with credit for double track saving $45,610 × 5.5 years =	250,850
Excluding amortization charge and without credit for double track saving $32,330 × 7 years =	226,310
Total for 12.5 years	$477,160
Average per year	38,170

Saving in annual operating expenses for dispatcher control plan vs. double tracking

	Dispatcher Control Plan		Double Track Plan
Distance, miles		38.1	
Freight trains per year		6,809	
Passenger trains per year		3,827	
Total train meets per year		12,885	
Overtime, hours saved	1,120		2,110
Freight train hours saved	3,123		8,432
Freight train stops saved	10,153		25,770
Cost of delay per train hour	$3.60		$3.60
Cost of one stop	1.00		1.75
Cost per overtime hour	6.45		6.45
Cash cost	$437,896		$2,607,814
Annual Operating Charges:			
Saving account stops	$ 10,150		$ 45,100
Saving account delay	11,240		30,400
Saving in overtime	7,220		13,600
Saving in operators	10,520		10,520
Total above	$ 39,130		$ 99,600
Less added maintenance expense	5,000		45,700
Net operating saving	$ 34,130		$ 53,900
Carrying Charges:			
Interest on construction cost at 5%	$ 24,060		$143,400
Less interest on locomotives released	5,000		8,000
Net increased carrying charge	$ 19,060		$135,400
Annual gain	$ 15,070		
Annual loss			$ 81,500
Salvage	$122,896		

Annual sinking fund to amortize entire investment in dispatcher-controlled system ($315,000) in 5.5 years, money at 5½ per cent interest is ..... $ 68,230

* * *



R. H. Aishton with the Cup Presented to Him in Honor of His Fifty Years of Railroad Service and his Sixty-eighth Birthday

Burlington Acquires Modern Lounge Cars

Glass-enclosed observation rooms are a popular feature —Cars also have a compact buffet

THE Chicago, Burlington & Quincy has recently received and placed in service five luxurious modern lounge cars, built by the Pullman Car & Manufacturing Corporation and designed entirely for lounging purposes for Pullman passengers on the Black Hawk and the Nebraska Limited trains operated by this road between Chicago and the Twin Cities and between Chicago, Omaha, Nebr., and Lincoln, respectively. In addition to the beautifully-decorated and furnished lounging rooms, the special features of this car include an enclosed observation porch with special glass windows designed to admit the ultra-violet rays of the sun; thermostatic temperature control in all rooms, including the observation porch, which is thus usable the year around; a compact but fully-equipped buffet.

Referring to the drawing, the general arrangement of the floor plan of one of the new Burlington lounge cars is indicated. The car is slightly over 80 ft. long and has a total seating capacity of 56. It will be observed that the observation sun porch, or sun parlor as it is called, occupies seven feet in one end of the car and has a normal seating capacity of six. The general lounging room, adjacent to the sun parlor is about 36 ft. long and seats 36. Next is the women's lounge, 16 ft. long and seating 14. The buffet occupies a length of about nine feet in the opposite end of the car from the sun parlor.

Interior Finished in Walnut

The interior of the car is finished in walnut throughout, except in the buffet, which is copper-bearing steel, white enameled, and in the sun parlor, which is copper-bearing steel, painted light green on the ceiling, side deck, deck rail, lower deck ceiling and trim, and dark green from the side plate moulding down to the floor, including the heater pipes. The ceiling or headlining in the general lounge also consists of large panels, painted light green, the headlining in the women's lounge, including the passageway at the buffet being light rose color panels. The general decorative scheme is an artistic blending of attractive but quiet colors, from the brown tone of the walnut panelling to the greens and gray-greens of the chairs, carpets and ceiling.

Quietly but Beautifully Furnished Women's Lounge

The homelike appearance of the lounge rooms is greatly augmented by artistic center lamps and two-light side bracket lamps. Three-speed ceiling fans harmonize with the lighting fixtures. Four of these center lamps are installed in the general lounge and two in the women's lounge. There are 14 bracket lamps in the general lounge, one in the women's lounge and four in the sun parlor. In addition, eight one-light bracket fixtures are located as needed on the bulkhead partitions, at two tables and at one desk. There are four ceiling fans, three in the general lounge and one in the women's lounge.

The windows of this car are wide and fitted with ¼-in. polished plate glass, except in the sun parlor where 5/32-in. Vita glass is used. The outside sash are of mahogany, and the inside, of walnut. End windows in the sun parlor are stationary, in one piece. Side windows in this room are of the single-sash drop type. Edwards sash fixtures and Pullman standard weather strips are applied. Shades, faced with silk damask and matching the general color scheme, are applied to all windows, including the sun parlor doors and stationary windows. These shades are equipped with all-metal rollers.

The floor covering consists of 27-in. carpet, of a design and color harmonizing with the upholstery in all parts of the car. This carpet is secured to the floor in such a way as to be readily removable. In the sun parlor 5/16-in. moss green and brown rubber tiling, with 4-in. squares, is used on the floor. This same tiling, but designed with 1½-in. squares, is used in the buffet hallway and vestibule platform.

View Showing Enclosed Observation Sun Parlor

Chairs Are Comfortable and Beautiful

The seating accommodations in this car, including the chairs, settees and a sofa were designed first for comfort and then for an unobtrusive blending of beautiful, quiet colors, with sufficient variety in design to relieve any possible monotony. In the sun parlor, six movable fiber reed chairs are provided, having padded backs and upholstered seats matching the green and brown checked design of the rubber floor tiling. These chairs, in conjunction with the unusually large proportion of window area and the provision of special polished plate glass windows, giving undistorted vision through both sides and the rear of the room, make the sun parlor one of the best patronized rooms in the car. Its popularity is by no means lessened by the practically complete absence of dust due to dust-proof construction, and forced air circulation. In case of necessity, four additional camp chairs are available for use in the sun parlor, bringing the total seating capacity of this room up to ten.

The general lounging room is divided practically in the middle by a section on either side of the car, especially equipped with removable card tables and deep cushioned Colonial grain-leather seats. Other seating facilities in this room include two settees, covered in figured cut and uncut mohair, and 19 movable chairs, including one writing desk chair, upholstered in both mohair and figured goods of colors which lend variety and yet blend with the general brown and green color scheme. Additional equipment in the general lounge includes a miniature library at one end, a writing desk, plate glass mirror, 12 portable stands for ash trays or service trays, match-box holders, electric cigar lighters, etc. This is believed to be the first car in which electric cigar lighters are permanently provided, and the installation of these modern conveniences illustrate how every detail of the car has been studied in an effort to give maximum service to the public.

The women's lounge, separated from the passageway by a low partition about 4ft. 10 in. high with an entrance opening in the center, embodies the same artistic color combination used in the rest of the car. It is equipped with two settees, five chairs, one writing desk and chair, and one sofa; also one ornamental plate-glass mirror and one clear-glass mirror with ornamental frame.

The small and compact buffet room is finished entirely in white and is provided with all the equipment necessary to prepare and serve sandwiches and drinkables. The equipment in this room consists of suitable locker and ice box facilities, a copper-lined sink with crow-foot drain and steam connections for heating water, shelves for glassware, cast-iron cooking plate for use with canned heat, coffee urn, electric toaster, annunciators, etc. These annunciators, of the latest design with metal push buttons, are located so that they can be easily reached from lounges, chairs and seats; also from the front platform and outside of the rear of the car. The refrigerator is of the vitreous enameled, bottled goods type, with all shelves arranged for individual bottles and a cigar humidor in the upper part. A cast brass receptacle, set in the floor between the refrigerator and the chipped-ice box, has a large drain for the disposal of refuse and a suitable cover. A water filter with overhead storage tank is part of the equipment.

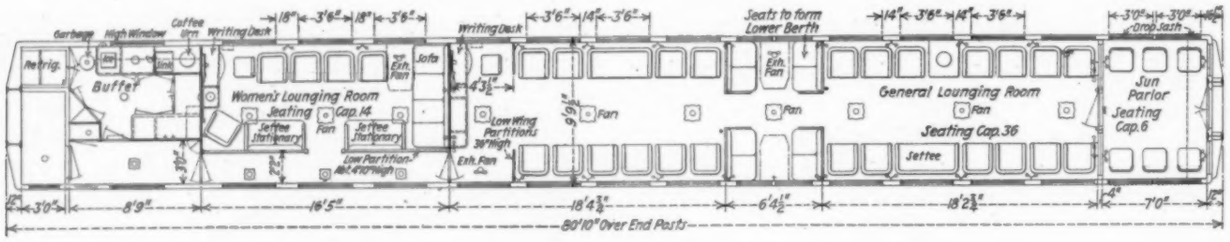
Particular Attention to Ventilation and Heating

The natural ventilation in the car, equipped with 13 roof ventilators, is augmented by means of five 9-in. exhaust fans and five bracket fans, and serves effectively to remove smoke or impure air from the lounge rooms, sun parlor and buffet. The general lounge carries eight ventilators, three exhaust fans and four bracket fans; the women's lounge carries two ventilators and one exhaust fan; the sun parlor carries one ventilator and one bracket fan; the buffet carries two ventilators and one exhaust fan.

The car heating system provides separate unit thermostatic temperature control in all rooms, including the sun parlor and buffet. Accurate thermometers for temperature control are located in three of the bracket lamp bases.

The 2-in. steam train pipe is insulated with 1-in. sponged felt, wired to the pipe and enclosed in a sewed canvas covering. Heater pipes in the car comprise a single row in the hallway to give maximum foot space and anchored to the side wall in such a way as to allow for expansion. Brass grilles throughout are of shell design. Steel foot rests are provided in the sections, and carpet fenders as required.

This car is equipped with quadruple shear drawbars and modern friction draft gears. A hand brake, with drop-handle brake lever applied at the end of the sun parlor, is furnished.



Arrangement of the floor-plan of the C. B. & Q. Lounge Cars

* * *

A Railway Hospital of the Imperial Japanese Railways at Sendai

Performance Records of Oil-Engine Locomotives*

Unit operating costs are reduced as the number of oil-engine locomotive units is increased

By Hermann Lemp
Consulting Engineer, Ingersoll-Rand Company,
New York.

FOR years, the advantages and disadvantages of the internal-combustion-engine locomotive have been brought to the technical forum, particularly in comparison with steam and electric locomotives. The high fuel economy, ease of operation and independence of the locomotive as a unit have been conceded from the beginning; the items of importance to be determined by actual service were the cost of maintenance and all around availability for service.

The gas-electric equipments built by the General Electric Company before the war have shown low maintenance charges and it was expected and hoped that the oil-engine locomotive would show equal results. The General Electric Company's experience showed that unit maintenance costs proved to be low when more than one locomotive was in use on the same railroad, but higher when only one unit was in service. The explanation was that 20 years ago, to discover and remedy defects promptly in an internal combustion engine, it required that the personnel of the steam maintenance department be educated and familiarized with the operation and the component parts of internal combustion engines, furnished as reserves, and when a number of rail motor cars were owned by one railroad, usually a special department was created to be responsible for the availability of the equipment.

With the oil-electric locomotives in commercial use in this country for more than two years, a somewhat similar experience is obtained with this exception: when but one equipment is in use, someone in the organization is made responsible for its maintenance, properly backed by the steam organization. The general use of automobiles, motor boats and stationary oil engines has greatly assisted in training the modern mechanic to a better understanding of the internal combustion engine and his present education pertains more to the difference between an engine with electric ignition using gasoline as a fuel and one using auto ignition by high compression with a heavy oil injected in atomized form by pressure.

The introduction of a new machine into a well-established business invariably brings with it difficulties from non-understanding to downright conservative opposition which will disappear with better acquaintance and when actual economies are reliably performed. It is also to be expected that a light high-speed Diesel engine on mobile equipment has problems of its own to eliminate, and taking both these natural obstacles under consideration, the practical experience of the last three years has been encouraging.

The oil-electric locomotive is the only oil-engine locomotive of standard gage which has any service records to offer in this country. Abroad, a 1,000-hp. oil locomotive with mechanical transmission (different gear sets controlled by electric clutches) has been in operation on the Russian railways since March, 1927, and a duplicate thereof is expected to be in service on the Boston & Maine by July, 1928. A. Lipetz, consulting engineer, American Locomotive Company, gives an account of the performance of this locomotive in comparison with an oil-electric locomotive of the same horsepower in the December, 1927, Railway Mechanical Engineer. The fuel consumption per 1,000 gross ton-miles is 13.05 lb. for the oil-electric locomotive, 11.81 lb. for the geared locomotive and 80 lb. for the steam locomotive, showing a saving of 9.5 per cent in fuel for the geared type over the oil-electric, while the steam locomotive used from six to seven times as much fuel as the Diesel engine locomotives.

While the above economies refer to fuel saving, no reliable data regarding maintenance and availability of the two Russian locomotives have been obtainable thus far. The fuel consumption, expressed in pounds per thousand ton-miles, evidently depends upon the profile of the road, load factor, speed of the train, etc., and unless these conditions are known and duplicated, cannot serve as a true comparison.

For instance, a 100-ton oil-electric locomotive built jointly by the American Locomotive, General Electric and Ingersoll-Rand companies, pulling a freight train of 377 gross tons weight, at an average speed of 18.7 m.p.h. from Erie, Pa., to Greenville, N. J., consumed 2,449 lb. of fuel or 17.1 lb. per 1,000 ton-miles. A similar locomotive, geared for passenger service, pulling four standard coaches of 280.5 gross tons from Hornell, N. Y., to Meadville, Pa., at an average speed of 37.7 m.p.h., used 980 lb. of fuel, or 18.9 lb. per 1,000 ton-miles; while a 60-ton oil-electric locomotive, pulling freight of a gross weight of 4,125 tons in New York at the rate of 2.8 m.p.h., with 43.8 lb. of fuel, covered 1,000 ton-miles with only 10.6 lb. of fuel.

A 100-ton oil-electric locomotive in the lumber district in California did 48,000 ton-miles in 19 hours with 1,312 lb. of fuel, or 27.3 lb. per 1,000 ton-miles. A modern steam locomotive equipped with a superheater also using fuel oil, working on the same job in the same location, did 37,000 ton-miles in 26 hours, using 10,000 lb. of fuel or 270 lb. per 1,000 ton-miles, nearly ten times as much. The oil-electric locomotives in operation in this country, both by railroads and in industrial yards, are used exclusively for switching purposes. Passenger and main line freight service is about to be inaugurated by the New York Central on its Putnam Division and performance records are, therefore, not available as yet. The performance of oil-electric rail motor cars would indicate that the maintenance of main line equipment will not be any more severe than that of switch engines. In Europe, particularly in Russia and Sweden, the main line operation is considered satisfactory.

*Abstract of paper presented by the Oil and Gas Power Division at the April 17, 1928, meeting of the Metropolitan Section, A.S.M.E., Engineering Societies Building, 29 West Thirty-ninth street, New York.

There have been installed in the last three years, up to January 1, 1928, fourteen 60-ton and five 100-ton oil-electric locomotives, jointly built by the American Locomotive, General Electric, and Ingersoll-Rand Companies, the 100-ton being provided with two 300-hp. generating units. One 60-ton oil-electric locomotive built by the McIntosh & Seymour, General Electric and the J. G. Brill companies, has also been installed. Two additional 60-ton and two 100-ton oil-electric locomotives built by the American Locomotive, General Electric, and Ingersoll-Rand companies are about to be delivered.

Attention is drawn to the report in 1927 of the Committee on Diesel Locomotives of the International Railway Fuel Association, in which answers to a questionnaire sent to the various railroads in America using oil-electric locomotives were appended. The replies received gave comparisons between steam and oil-electric operation and were analyzed by Mr. Lipetz in his paper "The Present Status of the Oil Engine Locomotive," which was read at the convention of the Mechanical Division, American Railway Association, Montreal, Que., June, 1927. From it he concluded that a 30-per cent saving in switching operating expense could be made over steam operation and for main line operation, a 50-per cent saving which was found in connection with the operation of Diesel rail motor cars.

Another questionnaire was recently sent out by the author to the various railroads and industrials who have bought these equipments and the returns were analyzed.

On 60-ton locomotives, the average availability, based on 24-hour service for 300 days per annum for 1927, has been 91.5 per cent, the lowest of which is 72 per cent and the highest 99 per cent. In this connection it is interesting to note that one figure of 81.5 per cent applies to the first locomotive installed and later repeat orders brought it up to 94 per cent. showing that the higher percentage is readily due to better familiarity with equipment. The 100-ton equipment shows a similar increase in availability but it has not as yet reached the average of 91.5 per cent.

The service these locomotives perform varies considerably. Some are on light eight-hour shift schedules with a load factor of less than 10 per cent. Their chief advantage lies in giving a smokeless and noiseless operation, required by law or ordinance in some localities such as New York. Other locomotives are operated on two eight-hour or three eight-hour shifts for six days, with load factors of 11 to 16.5 per cent. One locomotive has a load factor as high as 26.7. All of these locomotives do switching work.

To form an idea of the everyday work performed by the 20 oil-electric switching locomotives in 1927, note the following done by only two locomotives which were picked at random, one working single shift in New York; the other working three shifts in Chicago. The former generated 47,000 kw.-hr. with a fuel consumption of 11,500 gallons, and produced 671,000 ton-miles. The latter generated 149,200 kw.-hr. with a fuel consumption of 26,600 gallons, and produced 3,730,000 ton-miles. In Chicago, three 60-ton oil-electric locomotives of 300 hp. each have replaced six steam locomotives of 600 hp. each, to do the same work. They are employed 24 hours a day for six days with three crews per locomotive.

We find that 10.1 cents per locomotive-mile will cover maintenance expense even under the present conditions and this shows indication of improving. The load factor is determined by comparing the actual kilowatts delivered to the motors per hour with 200 kw., the 100 per cent possible per hour.

In contrasting steam locomotives with oil-electric locomotives for first cost, depreciation and interest, railroad companies are prone to take the pre-war costs of the former versus the present price for the latter. This is not exactly fair when one considers that the building of steam locomotives is a well-established industry with engineering and the overhead cut to a minimum, whereas oil-electric locomotives are still built in small quantities and mass-production practice cannot as yet be applied. First costs should, therefore, be compared on present steam-locomotive costs.

The railroads have for years looked forward to and deplored the absence of means for reducing the operating expenses. Some reductions in steam operation costs have been made in the past two years which, while showing progress, still deal with relatively small profits expressed in percentages, while the advent of the internal-combustion locomotive holds out promise of making substantial savings which may be expressed in hundreds of per cent. It would seem, therefore, that the railroads would be justified in co-operating with the manufacturers in the development and application of the oil-electric locomotive to railroad needs. The cost of oil locomotives is bound to come down when mass production is permissible and the greater availability and low fuel cost already admitted as economic factors will be supplemented by lower first costs, with lower depreciation and interest.

The very fact that the oil locomotive is a self-contained unit and may, therefore, be singly and step by step introduced in a railway system in the replacement of worn-out steam equipment without change of personnel or facilities, ought to encourage its introduction much faster than complete electrification where a certain density of traffic is necessary to make it practical. Whenever that stage is reached, the operating and maintenance department, already conversant with the electrical part of the oil-electric equipment, will find very little difficulty in going to complete electrification.

A battery oil-electric locomotive recently placed in switching service on the west side of New York City by the New York Central Railroad has attracted considerable attention. The battery and oil engine are both working under the most favorable circumstances when in combination, the latter working practically at a constant high load factor, insuring high average fuel efficiency, while the former is being recharged continuously during intervals in switching operation. The service record and availability of this locomotive will be watched with interest.

Discussion

One of the speakers, commenting on maintenance of the oil-electric locomotive, said that his road maintains a system of regular weekly inspection which is made by an electrician and a mechanic. These two men take care of all light repairs necessary to keep the locomotive in operation. This system, together with the fact that advantage is taken of all holidays, in making repairs, is a large factor toward increasing the availability of the locomotive. This locomotive, which has been in service for over two years, has been available for service at all times, due to the fact that heavy repairs have always been made when the locomotive was not needed. It is used on two successive eight-hour shifts.

He also pointed out that the wheel wear on this locomotive was comparatively small, although the yard in which the locomotive is used has a large number of sharp curves, some of which are of 90-ft. radius.

Protective Section Meets in St. Louis

High percentage of convictions and reductions in theft claims mark railway police activities

RAILWAY policemen established a record of 97.5 per cent convictions on all arrests in 1927. This is a record that far surpasses any made by municipal police departments and continues the excellent work done in the past. It should not be assumed, however, that the activities of railway police forces are directed solely towards apprehending culprits after crimes have been committed. As a matter of fact, their major duty consists of the prevention of crime. This is indicated by the reductions in freight claim payments on account of robbery, which, in 1921, amounted to $12,726-947, as compared with $1,151,136 in 1927, a reduction of more than 91 per cent.

These and other pertinent facts relating to the scope of railway police activities were brought out at the eighth annual meeting of the Protective Section of the American Railway Association held at St. Louis, Mo., on June 19, 20 and 21. More than 100 chief special agents and police chiefs were in attendance when the meeting was opened by T. E. Pratt, chief special agent, Chicago, Burlington & Quincy and chairman of the section.

In his address, the chairman called attention to the improvements being made in protective work on the railways. He pointed out the advantages to be gained by closer co-operation with safety and freight claim prevention activities, as well as with municipal peace officers, special agents of express companies and postal inspectors. In reviewing the achievements of railway police he stressed the fact that one of their principal duties is the care of young men. Youths, in rash moments, are likely to get themselves into difficulties. If, upon such occasions, they are sent to jail, it will probably ruin them for life, whereas kindly and sympathetic handling on the part of railway police may have the effect of making at least some of these "first-timers" useful citizens. In support of this argument, he cited, with pardonable pride, several cases on various railways throughout the country, where police officers have been the means of putting youths on the right track.

Other speakers on Tuesday morning included Col. Jos. A. Gerk, chief of police, city of St. Louis, who presented the delegates with a key to the jail and Wm. Briggs, superintendent of police, Central region, Pennsylvania, whose subject was: "Little Things that Count in Railroad Police Work." J. C. Caviston, secretary, presented his report and a committee, of which R. J. Edgeworth, chief special agent, Chicago River & Indiana, was chairman, presented a report on the identification of cigarettes.

In the afternoon, addresses were made by R. S. Mitchell, chief special agent, Missouri Pacific, on "The Price of Crime"; A. L. Green, special representative, freight claim division, A. R. A., on "Greater Use of the Protective Department in General Claim Prevention"; and F. F. Phillips, superintendent special service, Atchison, Topeka & Santa Fe, Coast Lines, on "Special Service Department Efficiency."

A report on sectional police committees was presented by a committee of which T. T. Keliher, chief special agent, Illinois Central, was chairman. These local organizations are quite active in the larger railway centers, holding regular meetings to thrash out general and specific problems. One valuable result has been closer co-operation with the city police officers, judges and prosecuting attorneys, who are invited and attend these meetings in large numbers. Another aid has been the inauguration of interline theft reports and the interchange of circulars of prisoners wanted. These interline reports give full details of any thefts of shipments to all lines handling such shipments and have facilitated the apprehension of thieves and the recovery of stolen property to a large extent.

Wednesday's Session

A comprehensive paper on the value of railway police to operating departments was submitted by C. W. Galloway, vice-president in charge of operation of the Baltimore & Ohio. Mr. Galloway was unable to attend and the paper was read, in his absence, by H. L. Denton, general superintendent of police, Baltimore & Ohio. An abstract of the paper follows:

There has been a great change in the activities and the personnel of the modern railway police department during the last 30 years. The type of men attracted to railway police work then was not of the highest order. Of course, there were exceptions to this rule but, because of their lack of training and discipline, these men caused the police branch of railroading to come into poor repute in communities and with railroad men generally.

Gradually, the railroads developed more highly organized police forces, centralizing the activities of their policemen under one head, and, as a result of the continued development, we find these departments today well organized with a great change in activities and personnel. Today, this department must be of a semi-military type, there must be military precision in the execution of orders, military deportment, and every man must understand the policy of his company as it concerns its relations with the public.

The book of rules of the police department must be understood by the men, thereby insuring uniformity in the handling of similar matters. The preparation of cases for presentation to the court is a vital thing. The necessity of instructing men as to the proper preparation of cases and what is competent evidence is an essential factor.

Great care should be used in the selection of men for employment in the police department. First, they should be of good character; second, intelligent, and third, physically qualified.

Inasmuch as the railroad police officer has a multiplicity of duties it is essential that he be carefully instructed as to what his duties are. An over-zealous policeman can bring about much criticism of his conduct. This feature should be guarded against. A railway police officer should conduct himself with decorum and when a situation is most trying he should be reserved and unexcitable. By proper instruction these things can be acquired by the police officer and he made a better representative of his company and a more creditable officer.

J. H. Butler, general manager, American Railway Express Company, spoke of that company's police and freight claim prevention activities, which have resulted in a reduction in losses because of robberies of over a million dollars in the past 17 months.

D. G. Phillips, safety superintendent, Wabash, who is also chairman of the Safety Section, A. R. A., spoke on the relations between the safety and protective departments of railways. He outlined ways in which these departments could be mutually helpful to each other.

H. T. Lively, general claim agent, Louisville & Nashville, and chairman of the freight Claim Division, A. R. A., spoke on "Interdependence of Freight Claim and Protective Departments." An abstract of Mr. Lively's remarks follows:

During 1927, claims paid and chargeable to known robberies amounted to $1,151,136 as against $9,924,747 in 1921, despite the fact that there was an increase of about 38 per cent in revenue ton miles. Claims paid for known robberies, unlocated and concealed losses in 1927 amounted to $5,296,741 as against $31,949,184 in 1921 or a reduction of 83 per cent. In 1921, robberies and losses constituted 33 per cent of the total loss and damage claim payments while in 1927 they contributed 14 per cent of the total payments.

A large part of the credit for this is due to the protective departments, but their work in this connection is by no means finished. They should have representation on all loss and damage prevention committees and should attend the territorial claim conferences so that first hand information can be had on the larger claim problems affecting a given territory. There are many ways in which representatives of the protective departments can aid the claim prevention department. Rough handling and unlocated damage constitute a big problem in loss and damage prevention activities. In 1927, 47.2 per cent of the total claim payments was charged to these two causes. Employees must be educated to the idea that cars can be handled expeditiously without damage to their contents. In your contact with yard and train employees you have a splendid opportunity to do missionary work along these lines. Your representatives in yards can do much to educate yard employees. This is particularly true in the case of perishables. A yard policeman, through his contact with unloaders and switchmen, can frequently prevent damage to such shipments.

Other addresses included those of Grant B. Miller, chief post office inspector, and A. H. Cadieux, assistant chief, department of investigation, Canadian Pacific.

Thursday's Session

O. P. Powell, assistant general manager, Pullman Company, outlined the activities of the special agents of that company and suggested means whereby Pullman and railway special agents should work together towards the common goal of the prevention of crime. N. S. Brown, vice-president and general solicitor, Wabash, spoke on the legal aspects of railway police work and the proper presentation of evidence before courts.

The results of the election of officers for the ensuing year was: T. T. Keliher, Illinois Central, chairman; J. D. Roosa, New York Central, first vice-chairman; J. W. Connelly, Southern, second vice-chairman. The committee of direction will be composed of: M. M. Skenyon, Hocking Valley, H. A. Russell, Maine Central and H. J. Page, Canadian Pacific.

Revocation of Directorship Orders Considered

WASHINGTON, D. C.

THE Interstate Commerce Commission has under consideration the revocation of orders issued in 1925 authorizing L. F. Loree, chairman of the Kansas City Southern, to serve also as a director of the Missouri-Kansas-Texas, and authorizing Charles Hayden, chairman of the Chicago, Rock Island & Pacific, to serve as a director also of the St. Louis Southwestern. Following a request by Mr. Loree for a hearing before the full commission the commission assigned his case for hearing on June 29 at Washington before Director C. D. Mahaffie of the Bureau of Finance, on the question as to whether the order should be vacated and set aside.

The fact that Division 4 had under consideration the revocation of the orders was conveyed to Mr. Loree and Mr. Hayden by Commissioner Eastman in letters dated June 5, stating that they would be allowed ten days in which to show cause why the orders should not be revoked. After an extension of time, Mr. Loree replied, on June 20, challenging the commission's power to set aside and cancel its order of authorization or to limit its grant of authority, asking for a specification of the charges against him or of any change in circumstances causing the consideration of such revocation, and asking for a public hearing before the full commission. After stating that he was advised that the commission does not possess such power, Mr. Loree said that if the commission shall decide that it possesses such power he felt that there was due him a formal statement of the facts and circumstances arising since the authorization on April 11, 1925, which, in the opinion of the Division 4, is sufficient to justify it in considering a revocation. He claimed his right to his day in court and, to that end, respectfully requested "not only that I may have a specification of the charges, if any, as above stated, but also, if the revocation of my authority is to be further considered, that I may be accorded the right of a public hearing, before the full commission, with reasonable opportunity to meet, in due and orderly course of procedure, whatever charges may be made against me." Mr. Loree added that at the election of directors of the M-K-T each director, including himself, received 851,840 votes and that 520,940 came from "the public at large," entirely independent of any stock owned by the Kansas City Southern, and said that it was a serious matter to consider disfranchising such stockholders.

The matter grows out of the proceedings relating to the application of the Kansas City Southern for authority to acquire control of the M-K-T and the St. Louis Southwestern, which was denied by the commission. Since then the Kansas City Southern has disposed of its stock in the M-K-T and the latter has applied to the commission for authority to acquire control of the other two roads. The commission has also issued a complaint charging the roads with violation of the Clayton law.

The order authorizing Mr. Hayden to serve as a director of the Cotton Belt was issued May 8, 1925, at the time the Rock Island had pending before the Commission an application for authority to acquire control of the Cotton Belt. It provided that the authority should cease at the expiration of 30 days after the date of any order denying the application of the Rock Island, but, after an unfavorable proposed report on the application, the Rock Island sold its stock to the Kansas City Southern.

R. C. Duff, the Waco, Beaumont, Trinity & Sabine Railway, and a number of Texas organizations have filed with the commission a petition asking leave to intervene in the proceedings as to Mr. Loree's authorization and declaring that "both public and private interests have been and are being adversely affected" by Mr. Loree's occupancy of directorships in both roads. They assert that the influence of the Kansas City Southern to suppress competition of the M-K-T can be effectively exerted through Mr. Loree as a director, chairman of the board and of the executive committee and principal executive officer of the M-K-T. The petition says that the K. C. S. acted in violation of the Clayton law in acquiring control of the M-K-T and that it has only "pretended" to sell its stock in the M-K-T by transferring it to its bankers with an agreement that the stock be re-transferred at a stipulated price to stockholders of the Kansas City Southern. Reference is also made to the pending complaint against the Kansas City Southern and other roads involved for alleged violation of the Clayton law, in which it is stated that it will be the duty of the commission to require complete divestment by the Kansas City Southern of stock of the M-K-T and Cotton Belt in such a manner that they will no longer be under the control or influence of the K. C. S. or its officers, directors or stockholders.

Cincinnati Operating Committee Promotes Terminal Efficiency

Reductions in unnecessary transfers, clearing up exceptions and many other benefits are secured

IN 1927, despite the heaviest interchange ever effected in the terminals at Cincinnati, Ohio, only 733 cars had to have their lading transferred. This compares most favorably with 1923, when 10,935 cars were transferred in these terminals. In addition during 1927, no less than 1,769 exceptions on l.c.l. freight were cleared up. Violations of a stringent city smoke ordinance were reduced to a minimum. These and other improvements were brought about by the increased co-operation of the railways involved, through the medium of the Cincinnati Operating Committee.

It will be remembered that operating committees were formed in about ten terminals in various parts of the country during the period of federal control. All of these, with the exception of the one in Cincinnati, ceased to function at the expiration of federal control. The present committee is a development of the original one and has amply justified its continuance by the results attained.

Owing to adverse physical conditions, the operation of the Cincinnati terminals has always presented a difficult problem. A large interchange must be handled under unfavorable circumstances, requiring co-operation among the various railways involved, if any degree of efficiency is to be had. The principal interchange is between the northern and the southern lines, all of which traffic must be moved across the Ohio river. The terrain on both sides of the river is so hilly that in most instances, it has been necessary for the railways to establish yards at a considerable distance from the center of the city. For example, there is a large interchange between the Louisville & Nashville yard at Decoursey, Ky., and that of the Cleveland, Cincinnati, Chicago & St. Louis at Sharonville, Ohio, a distance of some 30 miles.

Many years ago, in an attempt to secure the necessary co-operation, two operating organizations were formed in Cincinnati to consider the terminal problems, the Cincinnati General Managers' Association and the Cincinnati Superintendents' Association. These associations functioned until federal control, when they were disbanded and the Cincinnati Operating Committee formed.

At the expiration of federal control, the general managers of the lines entering Cincinnati held several meetings in which it was decided eventually to continue to maintain the joint office, for the purpose of keeping a machine set up for the neutral handling of grievances and for the arbitration of disputes which come up between the Cincinnati lines themselves and between shippers and the Cincinnati lines, which are not settled among themselves, despite the fact that all the other offices of a similar nature were being closed. It was felt that the operating committee would serve the peculiar needs of the terminal more satisfactorily than could be done by reorganizing the two associations which formerly exercised a certain amount of control.

The chairman of the committee devotes his entire time to supervising the office and the various bureaus which come under its control. There are seven other committee members, one for each railway entering Cincinnati, including the general managers of the Chesapeake & Ohio; the Norfolk & Western; the Cleveland, Cincinnati, Chicago, & St. Louis; the Southern; and the Baltimore & Ohio, while the Pennsylvania and the Louisville & Nashville are represented by their local superintendents.

Eight organizations come directly under the control of the committee, as follows:

Local Freight Agents' Association
Joint Car Inspection Department
Car Foremen's Association
Locomotive Operation Bureau
Smoke Inspection Bureau
Over and Short Bureau
Interchange Committee
Joint Messenger Service

In order that the size of the task confronting the committee may be understood, detailed figures covering the cars handled in the Cincinnati terminal are given in Table 1. It will be observed that traffic of all kinds in and through the terminal is showing a steady increase.

The Joint Inspection Department

The joint inspection department consists of a chief interchange inspector and two assistants. As a result of its activities, with the co-operation of the mechanical departments of the railways and the Car Foremen's Association, an immense saving has been effected.

The practice of transferring cars had grown steadily, until 10,935 cars were transferred in 1923 and 7,096 cars in 1924. In 1925, a committee of mechanical officers was formed to work in conjunction with the joint inspection department. Weeks were spent in the terminal, looking over cars that had been set out for transfer. This study showed plainly the need for a radical improvement. Accordingly, a plan was formulated whereby the joint inspection department, an impartial body, was given practically complete control of all transfers in the terminal. An arbitrary transfer charge of $21.50 was established, covering all commodities. This figure was arrived at after elaborate cost studies, which took into consideration not only the actual cost of transfer, but also switching, depreciation, rental of tracks, per diem, etc.

Under this arrangement, an immediate improvement was made. The reduction in cars transferred during the last half of 1926 was about 60 percent. By complete co-operation and hard work on the part of the inspection department, the number of cars continued to decrease rapidly, until, in 1927, only 733 cars were transferred in the Cincinnati terminals, despite a record-breaking interchange during that year.

Of 1,135 other cars that had been set out for transfer during 1927, part were marked O.K. to run and the rest were ordered repaired and run without transfer, making a saving in this item alone of $25,000. Inasmuch as a damage claim is filed on practically every car thus transferred, the saving in claims has been most sub-

stantial. Formerly, it was a regular occurrence for most of the lines to have from 150 to 200 transfers on hand, each of which required a car on an opposite track to receive the transferred lading. Thus, the reduction in cars transferred has not only largely reduced switching, but has released certain tracks and facilities for other uses. This has brought about a large reduction in operating costs and has resulted in the more prompt movement of cars through the yards involved.

Table 2 shows in detail the A. R. A. defect cards issued, transfer orders, adjustments and cleanouts, a total of 18,857, which were handled in 1927, under the jurisdiction of the joint inspection department. The improvement in eliminating unnecessary transfers is indicated by the record of cars transferred in the past eight years as follows:

Table 1.—Comparative Statement of Cars Handled—Cincinnati Terminal

Month, 1927	Loads (All) Inbound	Loads (All) Outbound	Total Loads Inbound and Outbound	All Lines Received In Interchange		Coal Interchanged	Lake Coal Included in Preceding Column
				Loads	Empties		
January	128,748	110,828	239,576	98,506	73,409	48,905	
February	131,339	117,918	249,257	105,228	90,678	56,286	26
March	147,582	132,747	280,329	115,152	90,588	69,247	4,320
April	149,096	129,640	278,736	113,936	94,430	54,357	11,452
May	167,440	150,554	317,994	131,838	103,752	62,925	19,472
June	152,985	135,532	288,517	118,766	98,109	72,442	15,321
July	158,912	138,078	296,990	121,471	96,915	54,685	16,420
August	164,530	146,102	310,632	130,645	104,543	81,283	14,066
September	157,812	142,262	300,074	123,856	96,189	61,233	9,357
October	156,205	135,568	291,773	120,939	93,104	54,522	10,696
November	123,514	109,241	232,755	94,508	80,111	51,163	4,756
December	116,337	104,846	221,183	89,340	77,744	41,333	29
Total	1,754,500	1,553,316	3,307,816	1,364,185	1,099,572	708,381	105,915
1926	1,673,214	1,522,335	3,195,549	1,319,162	1,047,811	661,492	103,290
1925	1,642,018	1,506,564	3,148,582	1,289,766	958,253	638,701	104,147
1924	1,481,700	1,339,564	2,821,264	1,126,383	805,590	524,640	49,171
1923	1,481,045	1,321,636	2,802,681	1,107,083	753,423	523,089	61,207
1922	1,237,878	1,117,659	2,355,537	917,835	627,590	438,960	59,457

Table 2.—Details of 1927 Transfer Record

Railroads	A. R. A. Cards	Transfers	Adjustments	Clean Out Orders
B. & O.	607	44	205	637
B. & O.—Toledo Div.	742	48	211	670
C. & O.	1,785	174	116	267
C. C. C. & St. L.	1,533	65	316	1,317
C. & O.—Chicago Div.	49	12	58	46
C. N. O. & T. P.	2,153	19	806	368
L. & N.	2,919	262	434	321
Penna.	771	50	214	1,175
N. & W.	307	59	56	41
Total	10,866	733	2,416	4,842
1920		9,365		
1921		9,671		
1922		6,455		
1923		10,935		
1924		7,096		
1925		2,222		
1926		932		
1927		733		

The Smoke Inspection Department

This department consists of a supervisor of locomotive operation and two assistants, all experienced locomotive enginemen. Prior to October, 1926, a rather unfortunate situation existed, in that the city smoke inspectors persisted in arresting engine crews for real or fancied violations of the smoke ordinance, thus undermining their morale, and bringing about a situation that was detrimental to the city and the railways.

Under the direction of the operating committee a meeting was held with the city officers during the month mentioned and an arrangement was entered into whereby no engine employees or railway officers were to be arrested for smoke violations for a period of six months. The railways in return agreed to make every effort to improve the situation. At the end of six months, the improvement was so apparent that the arrangement was made permanent and the question of locomotive smoke abatement was turned over to the railways, through the Cincinnati Operating Committee, for solution and adjustment.

During 1927, a number of meetings were held with engine crews where addresses were delivered by city officials and smoke abatement experts. In addition, other meetings were held, both during the day and at night, so that all the engineers and firemen in the terminal might attend. At these meetings, the importance of smoke abatement was explained, not only from a civic standpoint, but also that of health and fuel conservation. The crews have co-operated heartily.

The performance of the railways in smoke abatement during the year has received commendation from the city officials. Only 510 violations were reported by the city smoke inspectors and 200 by the Smoke Abatement League, during the year. When it is taken into consideration that 679 locomotives operate in the terminal every 24 hours, it will be seen that the violations are not excessive, particularly since, under the city ordinance, one minute of excessive smoke constitutes a violation of the law. During 1927, the smoke inspection department made 32,977 locomotive observances of one minute or more, of which 626 or 1.9 per cent violated the ordinance. This was a marked improvement in comparison with the previous year.

In addition, smoke inspectors rode and inspected 3,800 engines and reported 16,460 defects to master mechanics. These were principally small steam leaks and minor defects that did not affect operation, but might cause charges of excessive smoke.

A joint monthly survey of equipment was also inaugurated by the various mechanical departments. This has been productive of much benefit, not only from a smoke abatement standpoint, but in operating conditions as well. It has enabled the mechanical officers to pick up new ideas and has been a material factor in promoting good feeling by contact with the officers of the other lines. Federal inspectors visiting the terminal during the year have commented repeatedly on the improved condition of the power.

Other Committee Activities

Each member line has a representative on an over-and-short committee, meetings of which are held twice a month to match up overs and shorts. During last year, 1,769 such cases were cleared up, thereby eliminating a large number of claims and complaints from shippers and consignees.

The Local Freight Agents' Association meets monthly, or oftener if necessary, in the offices of the committee. Questions arising between the various lines incident to the handling of carload and less than carload business, rating, carding, and innumerable other matters, are threshed out and settled, with assistance from

the committee where necessary. The result of these meetings has been to establish friendly relations and close co-operation among the local freight agents. Many important matters have been settled across the table at these meetings, which formerly involved much correspondence and sometimes controversy and ill-feeling.

The Car Foremen's Association meets regularly in the offices of the committee to discuss M. C. B. rules, interpretations and various questions that arise covering the interchange of equipment. These meetings are presided over by the chief interchange inspector.

The Interchange Committee, consisting of car accountants, yard, per diem and interchange clerks, also meets once a month in the committee offices. Through the activitives of this committee, errors in interchange reports have been reduced to the minimum. Uniform methods have been evolved at these meetings which are of great assistance in this regard. So successful has this committee been that general officers from outside the city have invited its members to visit other terminals to aid in establishing similar practices there. One such visit was paid to Indianapolis, Ind., recently and visits to Louisville and other nearby terminals are scheduled. A joint messenger service is operated from the office of the committee. Regular trips are made to all the local offices, interchange offices and other points, delivering and collecting "pro" billing, interchange reports and other mail. This enables the agents to get their "pro" bills without delay and results in settlement being made promptly.

The Hoch-Smith Resolution

WASHINGTON, D. C.

CHAIRMAN J. B. Campbell of the Interstate Commerce Commission has addressed another letter to Representative Hoch, of Kansas, in the correspondence between them as to the proper interpretation of the Hoch-Smith resolution, in which Congressman Hoch has criticised the commission for spending so much time taking evidence as to the existence of an "agricultural depression." Whereas Mr. Hoch took the position that Congress had settled that question, Chairman Campbell, in reply to his letter of June 2, points out that it still remains for the commission to find out what products of agriculture are so affected. Mr. Campbell also says that the commission is not free to follow "such a summary method of procedure as might be adopted and followed by the Congress itself." His letter is in part as follows:

It happens that the meaning and bearing of the declaration in the Hoch-Smith Resolution with reference to "the existing depression in agriculture" were considered by the Commission in a decision rendered on July 14, 1926, in Revenues in Western District, 113 I.C.C. 3. I quote the following from pages 12-13 of that decision:

"As before indicated, it is contended that the resolution constitutes a legislative finding that a depression exists in agriculture, which raises an indisputable presumption in all investigations held under its provisions or commenced subsequent thereto that such depression in the agricultural industry does in fact exist, and that such presumption will remain until we report the results of our investigation held under the direction and authority of that resolution, or until Congress repeals it, thereby precluding any action under paragraph (2) of section 15a. The resolution in its first paragraph makes the basic declaration that in adjusting rates we shall consider the conditions which *at any given time* prevail in the several industries, to the end that commodities may freely move. This declaration is inconsistent with the construction that a depressed condition in agriculture must be conclusively presumed to continue until Congress again speaks. The last paragraph, in view of the *existing* depression in agriculture, directs that with the least practicable delay we shall make rate changes which will promote the freedom of movement of *products* of agriculture *affected by that depression,* including livestock. The language quoted is in the nature of a preamble. The resolution indicates that not *all* products of agriculture, including livestock, may be affected by that depression, and calls for a determination by us as to what products are so affected.

"If certain products of agriculture or certain kinds of livestock are not 'affected by that depression' they do not come within the direction of the last paragraph of the resolution. A primary purpose of the last paragraph was that because of the then existing depression in agriculture the products of agriculture affected by that depression should receive expediated consideration. It would not be a reasonable construction of the resolution to hold that it conclusively presumes the existence of depression in all products of agriculture, including livestock, until we report the result of our investigation held under the direction and authority of said resolution. The resolution itself directs that this investigation shall be thorough and shall cover the entire rate structure of common carriers subject to the interstate commerce act. Such an investigation must inevitably consume a long period of time. To construe the resolution as requiring us conclusively to presume the existence of depression in connection with all products of agriculture, including all kinds of livestock, and to accord to all such relief as is contemplated in the last paragraph would, to the extent that some of them are not affected by depression, constitute undue preference and cast undue burdens and give undue advantage as between the various classes and kinds of commodities in violation of the second paragraph of the resolution and section 3 of the interstate commerce act, and would compel us to ignore the first paragraph of the resolution."

This expression was unanimous; it was the result of very careful consideration following briefs and arguments which dealt, among other things, with this very point; and it still appeals to our judgment as sound.

In regard to the records in certain of the investigations which we now have under way, we can well understand your apprehension with respect to the volume of these records and the time consumed in making them. We fully recognize the desirability of their condensation in every possible way, and the problem involved is one which we have constantly in mind. The difficulty is to secure a condensation without an autocratic and arbitrary exercise of authority which would not commend itself to the country and which would endanger our findings and orders if they were subjected to court tests. Railroad rates, as you know, are full of complexities and in an investigation which involves the rates on even a single commodity throughout the country or in great territories of the country, there are an astonishing number of persons, companies, communities and localities which are profoundly interested and have a right to protect their interests, these often being quite diverse and opposing, by the presentation of evidence.

We realize, of course, that the Commission is simply an agency of the Congress, but we also realize that as such an agency we are not free to adopt and follow in the conduct of our proceedings such a summary method of procedure as might be adopted and followed by the Congress itself. As early as January 9, 1912, the Supreme Court expressed views concerning the jurisdiction to be exercised by a court, in determining whether an order of the Commission should or should not be enforced, which have been adhered to and consistently applied ever since in cases involving orders we have made under the authority conferred upon us by the interstate commerce act. These views were expressed in *Interstate Commerce Commission* v. *Union Pacific Railroad Company,* 222 U. S. 541, wherein, among other things, the court said:

"There has been no attempt to make an exhaustive statement of the principle involved, but in cases thus far decided, it has been settled that the orders of the commission are final unless (1) beyond the power which it could constitutionally exercise; or (2) beyond its statutory power, or (3) based upon a mistake of law. But questions of fact may be involved in the determination of questions of law, so that an order, regular on its face, may be set aside if it appears that (4) the rate is so low as to be confiscatory and in violation of the constitutional prohibition against taking property without due process of law; or (5) if the Commission acted so arbitrarily and unjustly as to fix rates contrary to evidence, or without evidence to support it; or (6) if the authority therein involved has been exercised in such an unreasonable manner as to cause it to be within the elementary rule that the substance, and not the shadow, determines the validity of the exercise of the power. * * *" (Id. 547.)

And in *United States* v. *Abilene & Southern Ry. Co.,* 265 U. S. 274, 288, pertinent language used by the Supreme Court was "Nothing can be treated as evidence which is not introduced as such."

However, the point which you make with respect to the length of these records is undoubtedly a matter of prime importance, and we shall continue to labor to the best of our ability with the problem which it presents. If you have any further suggestions at any time, we shall welcome them.

Over 200 Representatives Attended

Claim Men Meet at Omaha, Neb.

Motion pictures and x-ray important factors in determining liability in personal injuries

THE value of motion pictures and the x-ray in determining liability in personal injury cases was emphasized at the thirty-ninth annual meeting of the Association of Railway Claim Agents, held at Omaha, Neb., on June 20 to 22, with an attendance of over 200 representatives of steam and electric railways. At the opening session, Nelson H. Loomis, general solicitor of the Union Pacific, described some experiences in claim work and offered several suggestions for improving co-operation between the claim departments and the public. W. H. Bohart, M. D., chief surgeon of the Chicago & Eastern Illinois and chairman of the Medical and Surgical Section of the American Railway Association, gave an address on the relation of anatomical variations and anomalies of the spine to prognosis and the length of disability, in which he pictured the ease with which malformations, existing previous to the time of an accident, can be construed as resulting from the accident and described the methods and results of x-raying the entire spinal column of all applicants for positions on the Belt Railway Company of Chicago during the last three years.

Officers elected for the ensuing year include: president, Oliver G. Browne, assistant general claims attorney, New York Central Lines, New York City; vice-presidents, Smith R. Brittingham, assistant general solicitor, Seaboard Air Line, Norfolk, Va.; Frank Wenter, Jr., general claim agent, Chicago & North Western, Chicago; and J. C. Hume, general claim agent, Missouri Pacific Lines (Texas), Houston, Tex.; secretary-treasurer, H. D. Morris, district claim agent, Northern Pacific, St. Paul, Minn. Detroit, Mich., was chosen as the place for the next meeting on June 19 to 21, 1929. The recommendations committee suggested that steamship lines that are subject to the regulations of the Interstate Commerce Committee, be admitted as members of the Association.

Chicago Belt Investigates Spine Injuries

In discussing the relation between accidents and spine abnormalities, Dr. Bohart explained that nearly every patient who has had any kind of an accident, even though it is remote, and who discovers any sort of pain in the back, no matter where and when, almost invariably attributes this backache or pain to the accident. Ordinarily, he is not willing to believe that any back condition can be brought about by anything other than traumatism (the condition of the system due to the injury) and, in his own mind, can usually trace the origin of this trouble to some strain or blow. Most spines conform in a general way to what is known as normal, but there are many minor variations. Anomalies of the spine, according to statistics available, exist in from 8 to 10 per cent of all people. A significant fact presents itself in a larger majority of these cases.

The symptoms very generally persist as long as a hope for compensation exists, or is regularly paid, but disappear magically upon a lump sum settlement.

Whether persons with anomalies of the spine suffer injury of the spine oftener than those with normal spines and whether it takes a longer period of time for persons with anomalies to make a complete recovery is indicated in a three-year investigation made by the Belt Railway Company of Chicago under which the entire spinal column of all applicants for positions have been x-rayed. Due to the hazards of operation in its hump yard the number of back injuries is very high in proportion to the number of men employed. During the three years a total of 1,000 spines of men entering the service have been examined and almost half have shown variations and anomalies. In 1925 there were 47 back injuries of a greater or less degree, which resulted in the loss of 1,386 working days. Of the 735 men who showed anomalies of the spine only 12 have, to date, suffered an injured back. The use of the x-ray, in selecting employees, in part, has resulted in a lessening of accidents. In 1924 the average number of accidents per 10,000 cars handled was 13.9; in 1925, 10.1; in 1926, 8.7, and in 1927, 1.4. The accidents which occurred on the hump totaled 7.8 per 10,000 cars in 1924, 4.4 in 1925 and 4.4 in 1926.

During the study anyone showing an anatomical variation or an anomaly was permitted to go to work, provided he was in good health, physically strong and apparently able to do the work assigned, in order to discover if these conditions were conducive to injury or when injured, if the anomalies played any part in or delayed recovery. Approximately 40 to 50 per cent of these men have been injured but not an anomaly nor an anatomical variation participated in any injury. Not a back injury has been over 4 weeks in

recovering and in 3 years but 2 back cases have been litigated, as compared with a previous 47 in one year.

Grade Crossing Committee Reports Improvement

The Grade Crossing Committee of which H. A. Rowe, claims attorney of the Delaware, Lackawanna & Western is chairman, reported that:

"The railroad highway crossing accident situation showed an improvement in 1927 as compared with 1926. There were 5,640 accidents, a reduction of 281; 2,371 fatalities, a reduction of 120; and 6,613 injuries, a reduction of 378. This is in the face of more than one million additional cars registered during the year, the total as of December 31, 1927, being 23,127,000. We now have practically one motor vehicle for every five persons.

"Apart from the effective, though impractical, wholesale elimination of crossings by the separation of grades, etc., the key to crossing accident prevention probably lies in informing and reiterating to the auto driver the nature of the hazard at the crossing, the seriousness of which is shown in the fact that 36 per cent of crossing casualties result in fatalities; in providing frequent means of ready recognition of the presence of a road crossing; by emphasizing the character and meaning of the signs and signals used at such crossings; and by suggesting how the driver should proceed at the crossing. He should approach a road crossing expecting a train. The timely mental conception "A train is coming" assures the precautions necessary to avoid accidents. Instinctively the competent driver will make a full and complete observation, and if there is the slightest danger of meeting a train, he will stop in a safe place and will not attempt to proceed until the way is known to be clear.

"Believing the timely warning of the engine whistle is an important factor in crossing accident prevention, certain interesting data have been obtained through the co-operation of claims attorneys of 12 railroads geographically distributed. In examinations of 82 crossing accidents occurring in 1927 and involving 39 fatalities and 59 injuries, definite information was available as to engine whistle signals. It was found that 26 signals were completed at the crossing, 10 within 100 ft., 22 within 300 ft., 10 within 500 ft., 3 within 1,000 ft., and 1 within 1,500 ft.

"However, it was also disclosed that in 10 instances no engine whistle signals whatever were given. Whistles which terminated more than 500 ft. from the crossing (of which there were 14) may be termed inadequate in this motor age.

"To further analyze the thought of inadequate whistle warnings as contributing factors in crossing accidents, observations were made by competent claim men upon the same 12 roads where no accidents were involved. In 666 instances the whistle signal was completed at the crossing. In 826 cases the whistle signal was completed 100 to 500 ft. from the crossing. In 86 instances the whistle signal was completed 1,000 to 2,000 ft. from the crossing and in 38 cases no signal whistle whatever was given.

"The number of crossing mishaps is relatively very small compared to the number of safe passages made daily over crossings, but it is in this infinitesimal number that we must look, in part, for the cause of our crossing casualties. Over 11 per cent of the 82 investigated crossing accidents disclosed that whistle signals were not sounded: 2.3 per cent of our observations at crossings indicated the utter failure to sound the whistle and in addition 5.3 per cent of the cases could be classed as ineffectual whistle blowing. With the speed the modern auto makes it is possible for the car to be a far greater distance from the road crossing than the engine when it terminates its crossing whistle, and the weather conditions, closed car windows, etc., all tend to make engine whistles ineffective unless continued up to the crossing.

"An investigation discloses that the auto driver is confronted with a national lack of uniformity of design, character and meaning of signs and signals and, in many instances, is not afforded the type of protection which the special situation warrants. It appears desirable that claim departments cooperate with their managements in adopting uniform road rules and practices, and to encourage a uniformity of rules of the highway as outlined in the Model Traffic Laws and the Model Traffic Municipal Codes, prepared by the National Conference on Street and Highway Safety."

Claim Agent Reflects Personality of Railroad

Mr. Loomis in describing the duties of the claim agent and how his personality reflects the personality of the railroad said:

"One of the most important duties of the claim agent is the work of investigation and the most important thing about an investigation is the ascertainment of the truth. It is the mistaken idea of some, that facts which seem to be contrary to the interests of the road should be overlooked, supressed or distorted. This is a great mistake. The lawyers who are responsible for determining whether or not the company is liable should have all the facts, unfavorable as well as favorable, and, if under the law and the facts as they actually exist the company is liable, the claim should be settled.

"I doubt if the claim agent realizes the importance of his work and the position he occupies before the public. He not only investigates and settles claims but he stands as the representative ot the railroad in the estimation of the people with whom he deals. His reputation and standing are the reputation and standing of the railroad company; his method of investigating and settling claims the method of the road; and his personality, the personality of the railroad company. As he is liked, so is the railroad company liked; and as he is hated, so is the railroad company hated. It is therefore, incumbent upon him to "watch his step" and see to it that he does not bring the railroad company which he represents into disrepute.

"Questions frequently arise in the minds of railroad employees as to the relative importance of the different departments of railroad service. In my judgment such queries are worse than useless. Railroad service is like a chain—just as strong as its weakest link. All branches of the service are equally important and a railroad company could not dispense with any of them. Self-respect and high ideals add immeasurably to the satisfaction of life and should be cultivated by men in all fields of endeavor. Men are apt to consider their own line of activity monotonous and humdrum and to look longingly at the work of some of their neighbors or associates; but there is nothing like exalting and magnifying your own work and environment."

Public Responsible for Importation of Suits

Oliver G. Browne, assistant general claims attorney of the New York Central spoke on the subject "Can the Importation of Accident Suits be Prevented", saying in part:

"The ability to import freely to a favorable jurisdiction and there prosecute a cause of action for injuries, is one of the most valuable assets ot the so-called ambulance chasing business. In attempting to suggest defensive measures against importation, I would first recommend the fullest publicity of the meaning of such actions in order to educate the community supplying the forum. There is a principle, very general in application, which specifies that the forum is open to all citizens residing within its jurisdiction and this right is rather jealously guarded and liberally allowed bv the courts. But after all, the real power to control the situation is with the public. The public, therefore, should be informed of any misuse of this right and the effect of over-liberality in its availability. It pays the cost. A railroad lawsuit takes usually from two days to one week to try and the lowest estimate of the cost of maintaining the organization of a court and its retinue must be approximately $100 per day. Therefore, every action improperly brought imposes a needless expense on the community of the forum of that sum which is added to the tax bill of its citizens. Now, when a man from another community, or another state, comes into your county with his suit because the attorneys who secured his case happen to live there and to have a favorable atmosphere among the jurors and the courtroom attaches for his cases, your county is contributing at the rate of $100 per day or more to aid those attorneys to transact their business. The plaintiff himself is favored because his home county, which owed him the right to a forum, is not taxed at all. It is free from the expense, and, if the stranger in your yard happens to be a taxpayer in his home county, he has "sponged" on your forum and has not shared in the cost. How blind the public is to this and how little it is mentioned.

"If attorneys cannot get especially high verdicts in a community and have no means of exercising subtle influence over courts and jurors, they will go elsewhere. Their verdicts are usually brought about by a type of juror of an order of intelligence that has little appreciation of the meaning of an oath or a duty. The higher the average of intelligence the more likelihood of obtaining discriminatory verdicts or verdicts abounding in reason and common sense and commensurate with the facts presented. The remedy here is care in the selection of jurors. Take it out of politics.

"In one locality this was done by changing the law to permit the judges presiding in the county to appoint a jury commissioner, who holds office during the judge's pleasure. The commissioner examines into the mental qualifications of all jurors, making a personal examination of each one before he is placed on the jury list."

Physical Examinations More Rigid

W. E. Goodnow, chief claim adjuster of the Atchison, Topeka & Santa Fe, in discussing "Physical Examinations", described the methods employed by his road. He said in part:

"Prior to July 1, 1927, the only re-examination of employees in service which the Atchison, Topeka & Santa Fe required, was of train and enginemen, yardmen and operators; that is, such operators as had to observe signals. This examination was on vision, color, and hearing only and was made every four years. However, men engaged in the above service who were 45 years of age or more and who were required to wear glasses to obtain normal vision, were examined every two years. On this date the Atchison, Topeka & Santa Fe adopted and put into practice a new set of rules governing physical examinations. To begin with, the man now entering our service in any capacity above that of laborer is given a more complete physical examination than previously. In addition we have put into force the four-year re-examination of certain employees on vision, color sense, and hearing which embraces all employees whose work has to do with train operation, signals, and track bridges and building and water service foremen; and the two-year re-examination of those members of the above classes whose vision requires the use of glasses, or who have reached the age of 45. Furthermore, trainmen, enginemen, switchmen, hostlers, train porters and marine service employees must undergo a complete physical re-examination every four years. This re-examination of employees in service has been going on continuously by an examining board since September, 1927, and up to date there have been approximately 600 cases referred to our chief surgeon wherein the examining surgeon found disqualifying defects, the most common being hernia, high blood pressure, and kidney trouble. In extreme cases the man is kept out of service until his condition satisfies the attending doctor, but in the majority of cases the men remain in service and continue treatment under the direction of the doctor."

J. C. Hume, general claim agent of the Gulf Coast Lines described several methods of whistling and the development of grade crossing accident prevention.

"On the Missouri Pacific Lines in Texas, enginemen are requested to sound their whistle so that the last blast of the whistle will end close to the crossing. As the statute requires that the whistle be sounded ¼ mile from the crossing, this necessarily requires that the whistle signals be drawn out for some time, and when the speed of the train will not permit the length of the whistle to be drawn out sufficiently long to approach the crossing, another signal must be given closer to the crossing.

"I believe that one of the greatest benefits in Texas in the prevention of grade crossing accidents lies with the state and federal highway departments which are continuously eliminating grade crossings by changing trunk highways, thereby cutting out numerous unnecessary railroad grade crossings. The departments also do not permit signs that obstruct the view to be placed too close to the railroad."

Attitude of Public Can Be Influenced By Claims Agent

Frank Wenter, Jr., general claim agent of the Chicago & North Western spoke on "How the Public Can Best be Influenced to Respect the Claim Department and Recognize It as One of the Important Departments of a Railroad Organization". He said in part:

"The respect of the public for the claim department as a whole can only be fostered by the individual contact of the members of that department with the public and consequently, the degree of respect which the public may have for the railroad claim department as a whole, will depend upon the reputation made for the department by its individual members. The contact of the railway claim agent with the public is both direct and indirect. It is direct in the matter of investigations and adjustments of specific claims of the public, and indirect in the reflection of the manner in which the claim was handled.

"A further important contact with the public is also indirectly made in the dealings of the claim agent with the employees of his railroad, inasmuch as any reputation made for the claim department by its individual members with such employees, will reflect itself upon the friends, relations and associates of such employees. In the matter of winning the respect of the public for your particular profession, it will be hard to draw a line of demarcation between the occasions when you are acting in a professional capacity as distinguished from your position as a private citizen of the community in which your reside. For that reason, any and all attributes of character and conduct which will secure for your department the respect of the public in your professional dealings with it, must also be present in your association with the public as a citizen of your community.

"We may enumerate among the essential attributes which must be found in railroad claim agents to foster and retain the respect of the public for their departments the following: (1) courtesy, (2) honesty of purpose and intent, (3) a proper understanding of the matter in hand, (4) your willingness to give service."

C. H. Shutte, assistant general claim agent of the Missouri-Kansas-Texas of Texas, recommended more concentrated action and the development of new methods of detection so as to keep pace with the crook. "To my mind," he said, "there is only one way of stopping fraudulent persons and that is through centralized bureaus. If every member of this association would co-operate with his local bureaus by reporting suspicious claimants the matter would be simplified. In the case of disqualified applicants, usually no records are kept and when the person tries to "sell" a purported injury to another road no evidence can be uncovered although a record showing the condition to be of long standing exists and if found would show the falsity of the claim and enable its defeat."

H. D. Wagner, superintendent of the Illinois Claim department of the Employees Liability Assurance Corporation, Ltd., and president of the Mutual Information Bureau, Chicago explained the working of his bureau, saying that during the 35 years of its existence, records totaling 3,000,000 have been accumulated. The records are created not only upon inquiries received from subscribers but from newspaper clippings and damage suits filed. In the discussion following it developed that information can be secured from local bureaus such as those at Chicago and Cleveland for a nominal sum even though the applicant is not a regular subscriber to the bureau.

* * *

Photo by H. Armstrong Roberts

Freight Station Section Meets at Buffalo, N. Y.

Car utilization and the agents part in increasing efficiency of transportation discussed

MORE than 400 members of the Freight Station Section of the American Railway Association met at Niagara Falls, N. Y., on June 19 to 22 in the eighth annual convention of that organization and the forty-first meeting of the former American Association of Freight Agents. J. H. Rogers, agent of the Long Island at Long Island City, N. Y., was elected chairman of the section for the coming year. Other officers elected were: W. H. George, agent, Chicago & Alton, East St. Louis, Ill., first vice-chairman; G. R. Littell, agent, Baltimore & Ohio, Cleveland, Ohio, second vice-chairman.

The section, over which chairman G. B. Ingersoll presided, placed in effect a new plan for the membership of the committee of direction, dividing the United States and Canada into eight geographical districts and selecting one representative from each section. The members of the board of direction for the ensuing year are: W. C. McAlister, agent, N. Y., N. H. & H., Boston, Mass., for the New England district; C. C. Kinney, agent, Pennsylvania, Philadelphia, Pa., for the Eastern district; Henry Whyte, forwarding agent, S. A. L., Portsmouth, Va., for the Southeastern district; F. S. VanDusen, agent, C. P., Detroit, Mich., for the Central district; R. E. Palmer, agent, C. R. I. & P., Oklahoma City, Okla., for the Southwestern district; H. W. Wike, agent, N. P., Minneapolis, Minn., for the Northwestern district; W. A. Merriman, agent, S. P., Oakland, Cal., for the Pacific Coast district; A. M. Adams, general agent, C. N., Toronto, Ont., for Canada.

During the four days of the convention addresses were given by a number of railway officers including: N. S. Brown, vice-president and general solicitor, Wabash, St. Louis, Mo.; A. L. Greene, special representative, A. R. A.; H. C. Oliver, freight traffic manager, Pennsylvania, Pittsburgh, Pa., A. P. Stevens, district manager, Car Service section, A. R. A., Detroit, Mich., and J. E. Long, superintendent of safety, D. & H.

Freight car utilization was discussed in a paper prepared by members at Rochester, N. Y. A study of current statistics regarding the average annual freight transportation bill per person in this country as well as the present rate of increase in population indicates a 30 per cent increase in the minimum and maximum car loadings of the country, within the next decade. This will necessitate increased power, greater speed, improved utilization of the freight car in the form of a higher ratio between the weight of the contents and the car capacity, and more trips per car.

After recognizing the fact that the load differs as to characteristics, as one commodity differs from another, it is clear that shippers can co-operate in increasing its ratio of contents to capacity. As heavy loads originate on public team tracks and on certain private tracks and with much less frequency at freight houses, except when loaded as a "consolidation," an attempt should be made to place large cars in preference to standard cars where heavy loads originate while an effort should also be made to decrease the waste of car capacity at the freight house by excluding the 40-ft. car except for "consolidation".

The unassigned car is responsible for the purchase of new equipment which could be avoided if the movement of cars were increased; for the long haul of empties from connecting lines when an ample supply for nearby stations is at hand; for poor service to the patron; and for expensive switching operation. A freight agent can help conserve fuel by eliminating the unassigned car from team and private tracks. While contributing to fuel economy, he will be assisting other economic factors by providing other station demands out of his surplus by making possible a more flexible yard in which to switch, and by enlarging his yard. This car is often held as long as six days in anticipation of loading.

The agents at Kansas City, Mo., in a paper on the "Outbound Freight House", felt that the old idea that any kind of facilities and methods are good enough for a freight station must be dispelled. Much study should be given to the more scientific, efficient and economic handling of freight. Careful study should be given the trucking of freight, by man power or by tractor, when the average haul is 500 ft. or more; the use of the vericheck; the sending of all bills of lading to the block office for signature instead of permitting receiving clerks to receipt for shipments; the tonnage that should be handled per check clerk hour, and per labor hour; and the average tonnage that should be handled per hour by the combined force.

A freight house should be constructed with a view to the economical, expeditious and safe handling of freight, and with sufficient and proper facilities and equipment to enable the warehouse force to release shipper's trucks and wagons promptly.

The length of the building will depend upon the volume of business. The width should be 40 ft. if trucking is done by man power, and 60 ft. if it is accomplished by tractors with four-wheel trailers, this giving ample room to classify and make up tractor trains and for trains to pass one another without interference.

If there are more than two loading tracks, an island platform 20 ft. in width should be placed between every two tracks to obviate the necessity of loading through cars. This will save switch engine hours in spotting and "pulling the house," as it will not be necessary to uncouple cars when spotting and recouple them when pulling.

The one or more island platforms should be connected with either lift or disappearing bridges, one at each end of a platform and one or more between, depending upon the length of the platform and building. If trucking is done by tractor power, these connecting bridges should not be less than 20 ft. in width. All platforms and bridges should be covered to protect the men and the freight from weather.

The warehouse and platform should be provided with a compressed air tube system which connects the warehouse office and billing office with the warehouse and platform in order to effect a quick dispatch of

shipping orders, waybills, etc. A "dummy" telephone line connecting the warehouse office with different zones in the warehouse and platform will save time and man hours by enabling more rapid communication between the office and those working in different parts of the warehouse and platform. A hard, smooth surfaced pavement not less than 60 ft. in width should serve the receiving doors and platform, and a canopy should extend 15 ft. over the pavement from the warehouse to shelter the wagons and trucks while unloading freight at the receiving doors.

Charles F. McTague, assistant freight traffic manager of the Delaware, Lackawanna & Western outlined the importance of the local agent to the railroad and the community in which he resides. He said in part:

"The first human contact between the public and the railroad is usually through the local agent. Not so long ago he lived and worked in a very circumscribed area. Anything in the form of a suggestion from him was promptly rebuffed by the management. Since then the local agent has come into his own and knows he is a living, active force on every railroad. Broadly speaking, he represents every department of the railroad. and, in many communities, he is the first and last court of resort on all debatable subjects. He is expected to be non-partisan on every issue and at the same time is looked to for aid and comfort by every faction. This combination of diplomacy, ingenuity and resourcefulness must be all things to all men and at the same time steer the company he represents through the maze of local politics, community campaigns, uplift movements and civic reformations.

"My experience in a local freight office teaches me that there are four things of prime importance to a local agent—a spirit of loyalty, an instinct for business, a habit of courtesy and a sense of humor. So long as we are enrolled as employees of a railroad, we owe that company our undivided allegiance, one hundred per cent. No matter in what community we live, there is in the zone of our daily life constant opportunity to promote the business welfare of our company. Get the habit of doing something all the time, although once in a while it may be the wrong thing. A man who makes a mistake can be forgiven but a man who does nothing stays forgotten. We are in a period of keen competition and fast changing conditions. We are moving rapidly but whether it is forward, backward or sideways it is impossible at times to determine accurately. In fact, one bright mind has declared that a man must run like hell these days to stay where he is. Work and wait; everything comes to him who waits, provided he waits on the right corner.

"Courtesy pays its own dividends one hundred fold, both to ourselves and to our company. The railroads may spread themselves over this whole country and may have a huge army on their payroll but the average person forms his judgment of the railroads through his contact with one individual. If this person is uncivil or inefficient, it will take a lot of courtesy and efficiency to overcome the bad impression. Every member of an organization who comes in contact with the public in any capacity is a salesman, and the impression he makes is an advertisement, good or bad. Mr. George Hannauer, president of the Boston & Maine says, 'the railroad's public relations are to a considerable extent in charge of the local agent, the man who meets the public first and oftenest.'

"There is a field of missionary work for which the local agent is peculiarly adapted, and that is as a medium for an appeal to reason directed toward the so-called common citizen. The welfare of all the people, and the successful conduct of the business of the country are bound up in the unimpaired operation of the railroads. A curtailment of transportation facilities means a slowing up of the wheels of industry, a disturbance in the even flow of the necessities of life, with a consequent increase in the cost of living. Burdensome taxation, oppressive legislation and a never-ending campaign for lower rates compel the railroads to resort to drastic retrenchment, not only in the employment of labor but in the volume and quality of train service, in the purchase of necessary equipment, materials and supplies, in the maintenance of motive power, equipment and roadway, and in the normal development of the property. The railroads represent such a huge industry in themselves that the adverse effect of their reductions of employment and purchases ramify through the entire industry and commerce of the nation which, coupled with a reduction in service to the shipping and traveling public, can mean nothing but disaster to the whole country. In this situation, the carriers ask the aid of their local agents in an active appeal to the common sense and co-operation of the public at large for fair play and justice to the greatest single element in the life of the country."

Protest C. & O. Merger Decision

WASHINGTON, D. C.

SEVEN short line railroads that were intervenors in the proceedings on the application of the Chesapeake & Ohio for authority to acquire control of the Erie and Pere Marquette have filed with the Interstate Commerce Commission a petition for a re-opening of the case for reconsideration and re-argument, stating that the commission in its decision "grants the *strong* Chesapeake & Ohio the right to acquire the *strong* Pere Marquette, but denies the *strong* Chesapeake & Ohio the right to acquire the *weak* Erie, and imposes no condition which requires any of the intervening or other short lines to be acquired by the applicant." The principles involved are of such importance and far-reaching significance, they say, as to require the most careful reconsideration by the entire commission.

The petition is on behalf of the Arcade & Attica, the Arcadia & Betsy River, the Chicago, Attica & Southern, the Morehead & North Fork, the Mt. Jewett, Kinzua & Riterville, the New York & Pennsylvania and the Prattsburgh.

"The sanction of the combination of roads already strong and probably already earners of excess incomes," the petition says, "while denying or not requiring the inclusion of weak carriers, is entirely contrary to the spirit and purpose of Section 5 of the interstate commerce act, disregards and flouts the intention of Congress, and contradicts the commission's own representations to the committees of Congress when section 5 was under consideration.

"The sanction of the commission to any plan of acquisition, merger or consolidation should not be given, unless and until it clearly appears to be in harmony with and in advancement of a consistent plan for the ultimate consolidation of all carriers into a limited number of systems as contemplated and mandatorily enjoined upon the commission under and as an integral part of section 5 of the interstate commerce act.

"The commission's report erroneously excludes the weak Erie Railroad and its short line connections from the proposed system contemplated by the applicant.

"The commission erroneously finds that its principal concern respecting short lines is with regard to those connecting with lines of the companies over which control is to be extended rather than with regard to short lines connecting with the acquiring line.

"The commission's report improperly relies upon the applicant to voluntarily give adequate consideration to all the lesser lines of railroad which maintain direct traffic relations with its own line or the Pere Marquette, to the end that a final equitable disposition of them may be expedited.

"It is well known to all who have knowledge of the commission's wide variety of functions and the immense volume of its work that the burden and strain of current cases and of Congressional investigations is bound to be overpowering in its influence, but nevertheless it should not be forgotten that the commission has been charged with a most important responsibility to exercise its powers of fostering care and guardianship in preserving and upbuilding the outlying units of the national system of transportation, and the application in this case, as well as all other proposed or contemplated methods for uniting great railroad properties, should be assayed, tested and determined in the light of the broader considerations of national policy."

Hearing on Accounting Rules

WASHINGTON, D. C.

THE hearing before Commissioner Eastman and Andrew M. Bunten, chief of the Depreciation Section of the Interstate Commerce Commission on the proposed revision of the commission's accounting rules for steam railroads was concluded on June 22 with the expectation that further hearings might be held in the latter part of September, and on June 25 hearings were begun on the order relating to depreciation charges of telephone companies.

Following the general statement by J. J. Ekin, chairman of the committee of the Association of Railway Accounting Officers cooperating with the Interstate Commerce Commission in relation to the proposed revision, which was reported in last week's issue, statements indicating the views of the railroads were given by W. E. Eppler, comptroller of the Delaware & Hudson, as to the classification of investment in road and equipment, by E. M. Thomas, comptroller of the Chesapeake & Ohio, as to the classification of operating revenues, and by H. W. Johnson, comptroller of the Chicago, Burlington & Quincy, as to the classification of operating expenses.

This was followed by some additional testimony and still more cross-examination as to the applicability of cost accounting to railroad operation and particularly as to the alternative plan proposed by J. W. Roberts on behalf of the National Industrial Traffic League and the National Council of Traveling Salesmen's Associations.

The railroad witnesses in general took the position that cost accounting in the sense in which the term is commonly used is not practicable in its application to railroading and that the Roberts plan as presented is not complete and would be very expensive to carry out, while not accomplishing the purposes claimed for it. Mr. Roberts said he had not intended to present a complete plan.

Mr. Eppler said the accounting officers had drafted a classification of Investment in Road and Equipment, embodying their views on this subject, which has been passed upon and approved by the Committee on General Accounts. The following is a summary of the important features embodied in the proposed classification:

(a) Minimizing the refinements of accounting by a reduction in the number of primary accounts, enhancing the accessibility and utility of the results.

(b) Incorporation in the proposed classification of regulations for project accounting, which will simplify, and make uniform the procedure, and eliminate duplicate instructions by the Interstate Commerce Commission.

(c) Changing the minimum adjustment in Investment Account from $100. to $200., promoting efficiency and economy in accounting.

(d) Including in Operating Expenses, charges for service loss on road property retired and not replaced, for the reason that the cost of transportation facilities consumed in operation should become an operating expense.

(e) Including in Operating Expenses the cost of replacement in kind, of property retired and replaced with property of like purpose, so as to avoid fluctuations in capital account because of inflation or deflation of money values.

(f) Eliminating charges to investment for the cost of transportation for investment on revenue trains, for the reason that such charges ordinarily cannot be definitely determined and the allowances used are merely arbitrary estimates.

(g) Eliminating separate accounts for original road, original equipment, road extensions, fixed improvements, additions, and betterments, to conform with tentative revised classification of the I. C. C.

As to the proposed reduction in the number of primary accounts, he said the accounts proposed are: 1. Road; 2. Equipment; 3. Investment Suspense.

Account 1, Road, and 2, Equipment, are intended to be used as the permanent resting place of all charges showing the investment in carrier property. Account 3, Investment Suspense, is a suspense account for investment charges that have not reached final status. It is to be used as a clearing account in which to carry, pending completion and final placing of the property in service, the costs of major projects, the work on which extends over a considerable period; also for the carrying of suspense credits due to the inclusion in Accounts 1 or 2 of the actual or estimated cost of projects which are complete and in use, but in connection with which complete accounting has not been accomplished.

The absence of primary accounts in the proposed classification finds its justification, Mr. Eppler said, in the fact that the subdivision of road and equipment charges into five general accounts and 32 primary accounts, provided by the tentative revised classification of the commission, draft of April 26, 1927, or the even greater number of primary accounts provided by the present classification, is productive of no valuable nor indispensable statistical or accounting information. Therefore, the elimination of the requirement for such sub-divisions will not deprive the commission, the public, nor the carriers, of any useful data; but will substantially reduce accounting labor, and materially enhance the usefulness of investment accounting data that would, under the proposed classification be supplied to the commission, the public, and the carriers.

The investment primary accounts, as analytical factors, he said, do not possess any value comparable to that embraced in the primary accounts of operating expenses, for the reason that operating performance and expenses are inseparable instruments of control in practical railroading. This relation, or comparative value is entirely absent in the primary account statistics of investment. There may, very properly, be substantial dissimilarity from year to year in the character of investment expenditures as a road pursues a definite plan of development, dealing for a year or more mainly with one type of improvement which, upon completion, leaves the way clear for the consideration of another type.

The only unit of investment expenditure that can usefully be expressed in terms of money, is the project or job. It is by projects that extensions or improvements are conceived constructed and placed in use; it is by projects that they are judged as to their utility and productivity, and it is by projects that they are eventually discarded or replaced.

Probably, investment primary accounts, such as contained in the present classification should be ignored by the management in order to avoid confusion, Mr. Eppler said. If a railroad manager should undertake to review such primary accounts with a thought of the effect upon them, say, of a large yard layout recently completed under his direction, he would encounter countless obstacles in determining such an effect. He would be confronted with the difficulties incident to the analysis of the primary accounts for such elements of expense as engineering, land, grading, ties, rails, other track material, ballast, tracklaying and surfacing, station and office buildings etc., etc. Many examples might be cited where the expenditures on single projects are distributed between or among two or more primary accounts.

Another proposal, Mr. Eppler said, is to include in

the proposed classification those portions of the existing regulations of the Bureau of Valuation having to do with the recording of investment expenditures by projects, the preparation of authorities for expenditures by projects, the keeping of appropriate requests for such authorities, and the making of completion reports by projects.

Records such as those described in the paragraphs referred to are records indispensable in any comprehensive and well organized system of accounts and it therefore follows that the requirement for their maintenance should be a part of the accounting regulations of the commission. This is in line with the thought that it would be appropriate for all accounting regulations of the Interstate Commerce Commission to be a part of the accounting classifications, and therefore, be within the exclusive jurisdiction of the Commission's Bureau of Accounts.

"In giving expression to this thought," he said, "we are not unmindful of what evidently is the point of view of the commission itself regarding the responsibility of accounting officers as indicated by the questionnaire contained in the Commission's Circular of March 17th, 1928. It is, I believe, the view of the Interstate Commerce Commission that the accounting officers should have full authority over and responsibility for the accounts of the carriers. It would be helpful to the carrier's accounting officers if the commission's organization embodied this same principle."

Mr. Thomas said the suggestions which the Committee on General Accounts has made respecting the classification of operating revenues for steam roads relate specifically to the following:

(a) Instructions 103—Accounts for Operating Revenues, paragraph (d) which relate to the comprehensive statement indicating the particulars of the plan of accruals.

(b) Account 131—Heating and Refrigeration.

Instructions 103 in the tentative classification of operating revenues for Steam Roads, draft of April 26, 1927, state:

"It shall also furnish an explanation of its plan of adjusting accrual estimates to the actual revenue earned. No change shall be made in its practice of accruals before the particulars of its revised plan have been submitted to the Commission, except that if during any calendar year, due to exceptional traffic conditions, the carrier finds a modification of its general plan becomes temporarily necessary in accruing certain unaudited revenue, it shall furnish a statement to the Commission of such temporary modification."

"We believe, that mandatory requirements of this character are restrictive in their scope and operate to stifle initiative and prohibit experiments that would promote interest of railroad accounting. We do not think that any good can be accomplished by having to file with the commission a specific plan of accrual and then the carrier not be able to make any changes therefrom without the approval of the commission, and we certainly think that the methods of accruing unaudited operating revenues should be a function and responsibility resting with and left in the hands of the accounting officer of the individual carrier. I do not think that it is possible for the individual carrier to furnish a detailed plan of accrual respecting all items of revenue, and any plan which is filed with the commission must, necessarily, be constantly revised with respect to specific items of revenue, which will make a burden to the commission as well as to the individual carrier.

"Concerning Account 131—Heating and Refrigeration. The present accounting classification of the Commission requires the cost of icing cars in transportation service (including icing cars for refrigerating purposes) to be charged to Account 402—Train Supplies and Expenses, to which account credit shall be made for the amount of refrigeration charges collected from other companies and individuals.

"The classification of operating revenues for Steam Roads, draft of April 26, 1927, Exhibit No. 1 in this case, provides for the inclusion in Account 131 of amounts received under stated tariffs from refrigeration and heating service performed.

"In the case of sums received under stated refrigeration covered by published tariffs, amounts would be credited to revenue; amounts received from individuals and companies in protecting commodities in transit which are not covered by tariffs, but cover the same service, are credited to operating expense account 400—Train Supplies and Expenses. The service performed in both cases is an incidental and auxiliary service, and amounts received by the carrier for such service should, in our judgment, be considered as an offset to the expense for the protection afforded, and we believe that the recovery of such sums expended for protection of property in transit should not be classable as operating revenues."

Operating Expenses

Mr. Johnson said in part:

Little doubt can exist, I believe, in the minds of students of railway accounting but that the commission's classification of operating expenses is a scientifically conceived plan in the framing of which has been utilized the experience and knowledge of some of the finest minds skilled in the art of railroading.

Prudence and caution, should, and undoubtedly will be, exercised in approaching another revision of the operating expense classification, on, in order to avoid the perils of an upheaval of a plan conceived in experience and time tested.

It is possible to adopt almost any classification of operating accounts but railway accounting officers are held responsible for results and for returns justifying the outlay incident to their activities. Theoretical accounting, however finely spun the theories may be, is not the foundation on which any lasting structure of railway accounting can be erected.

It will be observed that the same general plan has been adhered to in the commission's tentative revised classification of operating expenses as heretofore existing. The number of primary accounts has been reduced from 197, contained in the now effective classification, to 123. A few consolidations of accounts have been made which experience has indicated to be desirable, largely because the line of demarcation between certain of these accounts was almost imperceptible; as for example the consolidation of present accounts 202—Roadway Maintenance, and 220—Tracklaying and surfacing, into one account, 202—Roadway and Track Repairs.

The representatives of the Railway Accounting Officers Association who have cooperated with the commission's representatives in this revision of the operating expense classification have made some suggestions which have been tentatively held in abeyance by the commission's representatives for further consideration, and those suggestions have not been given effect in the tentative revised operating expense classification offered in evidence in this proceeding.

Our recommendation that primary accounts be created for: Work Train Expenses, Shop Expenses, and Material Store Expenses (Including stationery store expenses) will first be dealt with generally, and then specifically as to each of these suggested accounts.

Expenses can be more efficiently stated, for purposes of managerial analysis, by eliminating prorates between departments, or between accounts in the same department. These suggestions contemplate removing from the present classification that element which hampers railroad management, and unnecessarily creates confusion in the minds of operating, mechanical, and other officials in the analysis of expenses under their direction, by, or through the use of accounting data. Such officials are prone to discard as useless, accounting information which they consider misrepresentative, and misleading, because it includes expenses beyond their direction and control. Orderly administrative procedure requires that an officer be held accountable for only those expenses which he originates, and for which he is directly responsible, and in analyzing his cost performance, the analysis should be so confined.

1. Primary account "Work Train Expenses."

It is our suggestion that a primary account "Work Train Expenses" be created under "Maintenance of Way and Structures" to which primary account all work train expense assignable to operating expenses would be charged. This suggestion is advanced for the reason that the major part of work train expenses is in connection with maintenance of way and structures and clearing wrecks and no real purpose is served in assigning practically all of that same expense to the various primary accounts under the one general account, Maintenance of Way and Structures. When merged with other accounts, the total cost of work train service loses its identity and, to that extent, whatever supervision over it the accounts permit, is lost.

While work train service may be theoretically chargeable

to the class of work for which performed, the refinement of accounting in assigning to the various primary accounts under the one general head appears unjustifiable, when, for all practical purposes, the same or more effective results can be obtained by the creation of one primary account.

The amount of work train expense assignable to operating accounts other than Maintenance of Way and Structures, is negligible and its inclusion in Maintenance of Way and Structures would produce no discernable distortion of the account. Even as to clearing wrecks there is sound argument for inclusion of that amount and its work train expense under Maintenance of Way and Structures.

2. Primary Account "Shop Expense."

For the same general reasons hereinbefore indicated, it is our recommendation that a primary account, "Shop Expense" be created under "Maintenance of Equipment" to which all charges for shop expenses would be made. Under the present classification, shop expenses are accumulated in a clearing account and prorated to primary accounts benefited. While some shop labor is engaged on work not connected with Maintenance of Equipment, the preponderance of shop expense is directly assignable to equipment repairs and the relatively insignificant amount of shop expense now assigned to other accounts does not warrant the prorating of shop expenses to the various accounts affected.

Under our suggestion it is expected that the shop expenses assignable to investment account or to manufactured material will be charged thereto. To create separate primary accounts for clearing accounts with a contra credit account to permit spreading to various other primary accounts only half meets the situation. That method still forces the prorating and continues the more or less confusion resulting from charging to local expenses, amounts which are not subject to local control.

3. Consolidation of the "Enginehouse Expenses" accounts.

It is our suggestion that the primary accounts "Enginehouse Expenses—Yard" and "Enginehouse Expenses—Train" be consolidated. The separation of expenses between these two accounts is meaningless, the assignment between "yard" and "train" being on a purely arbitrary basis which cannot produce accurate results. The consolidation of these two accounts into one primary account would do away with a now existing accounting refinement which, from the carriers' standpoint is of no practical value.

4. Creation of a new general account, "Miscellaneous."

It is our recommendation that a new general account called "Miscellaneous" be provided to include the following primary and clearing accounts: (the account numbers quoted below are those appearing in the tentative revised classification of operating expenses prepared by the Bureau of Accounts of the commission).

(a) Valuation Expenses—Account 467.
(b) Pensions and Relief—Account 465.
(c) Casualties—The account to include:
    1. Injuries to Persons—Accts. 220, 310 and 417.
    2. Loss and Damaged Freight—Account 415.
    3. Other damages—
        A consolidation of the following accounts:
        413. Damage to Property;
        414. Damage to Live Stock on Right of Way;
        416. Loss and Damage—Baggage.
(d) Material Store Expenses. (New primary account to include both material store expenses and stationery store expenses, now handled through clearing accounts and prorated to various primary accounts).

The transfer of "Valuation Expenses" and "Pensions and Relief" from the present "General Expenses" is recommended because those primary accounts do not constitute general expenses as that term is ordinarily understood, and the inclusion of those two items under "General Expenses" seems erroneous.

In conclusion, it may properly be stated that the railroads have not sought any revision of the commission's classification of operating expenses, but if the Commission decides that a revision of that classification is necessary or desirable, as president of the Railway Accounting Officers Association, I tender to the commission the fullest cooperation of every branch of that association and we will gladly serve the commission in any and every way possible.

John H. Williams, management engineer, was called as a witness for the Taylor Society in response to a suggestion of Commissioner Eastman that the testimony of earlier witnesses for the Taylor Society be supplemented by more specific evidence of the applicability of current cost finding practices as described by previous witnesses to the railroad field. He said he was not particularly familiar with railroading and was not familiar in detail with the present plan of accounting observed by railroads. He said he had an impression that it was a "pretty good" system of accounting on the budgetary basis.

He said that there is no question at all about the practicability of applyiing a system of cost accounting to steam railroads but that the purpose should be to ascertain "standard" costs, to avoid the fluctuations incident to special conditions inherent in actual costs. He said that it would be a "terrible job" to install such a system and that it should be done in stages. He suggested that the present accounting classification should be revised by the addition of some accounts and units for the distribution of overhead and the elimination of others, so that it will lend itself to the obtaining of "over-all service costs" without distorting the direct cost records used for budgetary control, and he assumed that the cost accounting shall be entirely separate from the general accounting. A minimum number of accounts and distribution units should be used at the outset but they should be determined with a view to their possible further expansion at a later date.

Mr. Williams said the "alternative plan" proposed by J. W. Roberts was "thoroughly sound and all right in principle," without reference to its details, and that "there is no reason it should not work in railroading."

L. R. Bitney, statistician of the Minnesota Railroad and Warehouse Commission, and chairman of the Statistical Committee of the National Association of Railroad and Utilities Commissioners, presented a plan for a revised classification of operating revenues and expenses which the committee recommends for adoption, saying that in his experience in rate cases the accounts of the carriers had failed to adequately serve the purpose desired. He said the committee's plan was not designed to be complete and that if the principles were approved by the commission its corps of experts would be able to formulate the necessary rules, formulas and instructions. In the opinion of the committee, he said, the demand of today is for a classification in which appropriate accounts are provided for the segregation of charges attributable to distinctive functions and classes of maintenance and transportation services and for the segregation of expenses in a manner that will "best meet the requirement of cost of service ascertainments," because "costs are fundamentally necessary in the determination of fair and reasonable rates." The proposal provides, he said, for the current accumulation of data necessary for the ascertainment of reasonably accurate and satisfactory average terminal and line-haul costs. He also urged a segregation of operating expenses and income charges and credits affecting net railway operating income by states, in accordance with a formula contained in the 1926 report of the association's committee on statistics and accounts of steam railroads, and a mileage pro-rate of revenues from interstate traffic. Carriers also should be required to establish and maintain a permanent record of property values by states.

Mr. Woodson offered to arrange to have certain representative railroads make a thorough analysis of the plan, with some practical application of parts of it, and to report the results to the commission. He suggested that the roads could probably do more constructive and helpful work in this connection if permitted at least a few months for the purpose, but Commissioner Eastman said he could not see his way clear to allow more than some time in the latter part of September. He said

the commission would endeavor to keep in touch with the progress of the study.

Major Oliver, attorney for the commission, in cross-examining J. J. Ekin, asked several questions as to the extent to which accounting officers may be "influenced" by their superior officers. Mr. Ekin said that he was appearing as chairman of a committee representing the carriers generally and that "there has been no direction or effort to influence us." Asked if he as chief accounting officer of the Baltimore & Ohio was free to advocate cost accounting, Mr. Ekin said he had never been restrained and that the only direction is "always be careful and do not incur unnecessary expense."

"How do you harmonize your statement that you have been free and unrestrained with the action of the executives in connection with the depreciation recommendation by the joint engineering and accounting committee?" asked Major Oliver.

Mr. Woodson answered that as far as the association is concerned it had adopted a resolution stating that it did not regard depreciation as an accounting matter, and when the commission asked for cooperation in relation to the provisions of the transportation act relating to depreciation it had referred the subject to the Association of Railway Executives which had placed it in the hands of the Presidents' Conference Committee on Valuation. The latter appointed a subcommittee composed of engineers and accounting officers, who made a report, but the accounting officers did not represent the Railway Accounting Officers Association.

Mr. Ekin said there has been confusion of terms about depreciation but that he was talking about the accounting features of the problem and that as far as he was concerned he believed that "if the subject is approached in the proper light, the correct thing to do is to take our large facilities which can be identified, and for which the facts can be determined, and to work out a plan for equalizing the retirement of such facilities." "I want it understood that I am not hedging on that question," he said, "but that is where I stand and where the management of the Baltimore & Ohio stand."

F. W. Sweney, comptroller of the Northern Pacific, and formerly chief examiner of accounts of the Interstate Commerce Commission, gave some criticism of the Roberts plan, saying that without the knowledge of the accounting officers association the Northern Pacific representatives had studied it from the standpoint of an effective Interstate Commerce Commission order and had sought ways and means of applying it at minimum cost. Also the Northern Pacific had drafted a general cost accounting scheme and had rejected it because after mature consideration it could not be shown that the results would justify the additional expense. Special studies, he said, constitute a continuous performance on all railroads, and have been found to be vastly more useful than any general cost plan could be.

Mr. Sweney said he agreed with J. E. Slater that the arbitrary bases of apportionment of the Roberts plan are not sufficiently accurate to make the statistics useful for checking purposes. He also said "it would be too much to expect organizations like the National Industrial Traffic League and the National Council of Traveling Salesmen's Associations to be acting from altruistic motives in spending time and money in developing a railroad cost accounting plan for the sole benefit of carriers and the commission" and that therefore "they will not object if carriers hesitate to adopt a revolutionary and expensive scheme of accounting unless and until proof is produced to show that it will accomplish what Mr. Roberts claims it will, and more effectively than present methods." Moreover, he said, the scheme is not complete; "the aspects and details necessary to a practical application have for some reason been omitted," and "the commission is expected to supply and prescribe these missing aspects and details."

"As it now stands the scheme appears to be much like one for building a railroad from Chicago to some distant, foggy and indefinite objective—perhaps London —no provision having been made for the aspects and details of bridging the Atlantic."

The Northern Pacific representatives had labored to find practical ways and means for making the plan effective at minimum cost, he said, and had estimated that it would cause an additional expense of not less than $635,000 for the first year and $435,000 each year thereafter. He was convinced that statistical data developed under the plan would be less valuable to executives than those compiled under the present system of accounts and that to make it effective the commission would have to take the bare outline presented, "inaccurate, cumbersome and hazy as to the results to be accomplished, and complete it, prescribing for sake of uniformity rules that will meet the innumerable railroad accounting problems."

Major Oliver and Mr. Roberts asked if it would not be a good thing for the railroads to know how much they are losing by transportation for the government at reduced rates on account of land grants. They took the position that this represents a charge against other traffic and Mr. Roberts referred to it as a "rebate." Mr. Sweney said that in 1927 the amount by which the government transportation was handled by the Northern Pacific less than tariff rates was $475,000, but he insisted that if it represented any loss it was not paid by the remaining traffic because the company had earned much less than a fair return. From 1874 to 1927 he said the amount by which the government paid the Northern Pacific less than tariff rates was $16,836,878.

Mr. Sweney was cross-examined at some length regarding the general question of the applicability of cost accounting to railroad operations during which there was some discussion of the practice of the United States Steel Corporation. Mr. Woodson put into the record a letter from A. W. Vogt, assistant comptroller of the steel corporation in which he said:

> One of the most serious and elusive elements to deal with effectively in systems of cost finding has to do with that class of operating expenses or items of manufacturing cost ordinarily designated as Indirect Expenses of production, that is, expenses which it is not possible to allocate to any specific unit of production. When these indirect items of expense are present to a degree where they constitute a major part of the cost of manufacture or of performing a service, they complicate very materially every effort to secure precise or dependable unit cost results. Fortunately, in the iron and steel industry items of direct operating expense make up by far the largest element in production costs, thus not only simplifying the methods of reporting and the accurate allocation of expense items, but guaranteeing a reliability to cost results that could not otherwise be secured.
>
> Although the cost accounting procedure throughout the corporation in its many lines of diversified activities has been well co-ordinated, it has never been found expedient to attempt any inflexible standardization. Its cost finding procedure has been suited to fit the practical needs of each industry; it does not prescribe the same detailed cost procedure for a blast furnace making pig iron as for a struc-

tural fabricating shop; for a coal mine as for a zinc smelter; for a rail mill as for a foundry. Obviously, methods of cost determination applied to any of our steel mills could in no sense be fitted to and be made applicable to our transportation operations, anymore than could our cement plants follow a system of cost finding that meets the requirements of a by-product coke plant. Each in itself has its own peculiarities. Each calls for specialization within its own field.

In response to a suggestion from Commissioner Eastman that Mr. Roberts comment on the testimony in criticism of his plan given at an earlier hearing by J. E. Slater, secretary of the American Brown-Boveri Electric Corporation and formerly special assistant to the general manager of the New York, New Haven & Hartford, who had appeared at the request of the National Industrial Traffic League, Mr. Roberts replied that it represented an "embarrassing circumstance" and, in a way, a "joke upon the National Industrial Traffic League". He said that as it was 14 years since he had been on a railroad payroll he thought he had a better perspective, but that in the case of Mr. Slater there was some reason for doubting whether the absence was of very great, if any duration. Commissioner Eastman asked if he intended to indicate that Mr. Slater was still in the employ of the carriers. Mr. Roberts said that when he asked Mr. Slater to testify he had not known just what he would say but had let him know he was seeking to give the commission the benefit of views of men who were not in the railroad service, and in his judgement the testimony "went somewhat counter to the general principles we had discussed and apparently found our minds in agreement about as in our initial conference." After Mr. Slater had testified, Mr. Roberts said, he had heard outside the hearing room that Mr. Slater "was to be with the New Haven again in connection with work about to be undertaken on the New York commutation rate case" and "from that circumstance I am led to believe that he was a railroad man."

Mr. Roberts said he was not intending to reflect upon Mr. Slater in any way but Mr. Woodson said that if the record disclosed that he was making any imputation against a specific railroad or the railroads generally the railroads would ask an opportunity to present the facts. Commissioner Eastman said they would be given that opportunity.

P.& W. V. Extension Approved

WASHINGTON, D. C.

BY a five to four decision the Interstate Commerce Commission has authorized the Pittburgh & West Virginia to build its proposed extension from a point near Cochran's Mill to Connellsville, Pa., 38 miles, which was vigorously opposed at the hearings by the Pennsylvania, the New York, Chicago & St. Louis, the Baltimore & Ohio and the Wheeling & Lake Erie. The New York Central, which controls the Pittsburgh & Lake Erie, stated that it would offer no objections.

Commissioner Eastman wrote a dissenting opinion, in which Commissioners Aitchison, Woodlock and Brainerd concurred, taking the position that the decision ought either to be held in abeyance or that it ought to be dismissed without prejudice to renewal at a later date in the light of developments in other proceedings now pending and preferably in connection with proceedings involving the general question of the unification or grouping of systems in eastern territory. Commissioner Meyer was absent when the vote was taken but desired it stated that if he had been present he would have voted against the report, and Commissioner Farrell did not participate in the disposition of the case.

The majority opinion stated that the "two strongest arguments in favor of the new line are:

"(1)that it will open up a new route through the Pittsburgh district which will avoid the yards and junction points where congestion is now liable to occur, and (2) that it will provide a permanent connection between the Pittsburgh & West Virginia and the Western Maryland so that they may, in combination with the Wheeling & Lake Erie and possibly the Wabash, furnish a new and independent through route from the steel-producing territory, Lake Erie, and points beyond to the port of Baltimore."

However, it added that "it should be borne in mind that this application is for an extension of a line of railway, and should be and is here considered by us separate and distinct from the question of any future grouping of the railroads into a limited number of systems, and, in our judgment, covers a construction that the present and future public convenience and necessity does require."

"As against the strong evidence as to the present or future public convenience and necessity for the construction of this connecting link, the intervening railroads objecting to the granting of this petition have not seriously attempted to contradict any of the testimony here referred to, but have rested their objection, at least mainly, if not entirely, upon an estimate of the cost of this work, which seems to be excessive, and for which they incur no direct liability."

In discussing the need for the extension the majority report says in part:

The cost of the new line, according to applicant's estimate, would be $12,801,619. The applicant's estimates of traffic and of cost were sharply attacked by the interveners and were made the subject of prolonged discussion and much conflicting opinion. The Baltimore & Ohio had the route of the proposed extension examined by its engineers, who estimated its cost at about $22,846,000. It is unnecessary to review this evidence in detail. While its general purport is to indicate that the estimate of about $12,800,000 may be too low, it at least appears to be more nearly correct than that of the Baltimore & Ohio. As counsel for that line admitted during argument that the objection of that company to the granting of this application would be exactly the same if the cost was only one-half as much, this fact removes any necessity for seriously considering its objections based upon its estimates of cost.

To rest a decision solely upon the foregoing considerations would be to ignore what must be regarded as the applicant's principal contention, which has to do with the future of the Pittsburgh & West Virginia as an independent transportation agency. Witnesses for the Pittsburgh Steel Company placed great importance upon the utility of the routes to St. Louis and other points in mid-western territory by way of the Pittsburgh & West Virginia, the Wheeling & Lake Erie, and western connections. In the early months of 1927, the New York Central, Baltimore & Ohio, and New York, Chicago & St. Louis secured a majority of the stock of the Wheeling & Lake Erie, with the ultimate purpose of sharing the control of that line as a feature of a four-system plan for consolidation of carriers in eastern trunk line territory. This commission, however, has denied an application of the principal officers of these three lines to become members of the board of directors of the Wheeling & Lake Erie. At about the same time, the Baltimore & Ohio acquired a large stock interest in the Western Maryland, with which it competes between Connellsville and Baltimore, but the question of the legality of this control is now before this commission. It also appears that the Baltimore & Ohio and the Wheeling & Lake Erie have entered into a traffic agreement whereby the principal interchange of freight between those companies is at Terminal Junction, a point near Wheeling. Interchange through this junction involves the use of the Baltimore & Ohio line to the east through Grafton, W. Va., and Cumberland, Md., instead of the route through Connellsville. The Wheeling & Lake Erie intervened in opposition to the application, which may be explained by its control by the Baltimore & Ohio, the Nickel Plate and the New York Central, and stated, among other things, that it preferred interchange on eastern traffic with the Baltimore & Ohio at Terminal Junction, instead of using the route by way of the Pittsburgh & West Virginia, as the former would give it an increased haul of about

twenty-eight miles. It fears that the construction of the proposed extension might result in diversion of traffic to the less favored route and might also result in the closing of a present available route over the Pittsburgh & West Virginia with interchange with the Baltimore & Ohio at Bruceton, on the West Side Belt. The Western Maryland, like the New York Central, took no formal part in this proceeding.

Under these circumstances, the Pittsburgh & West Virginia fears not only that its future expansion will be prevented but that its present business and investment are jeopardized by the plans of the trunk lines; and that its future prosperity and utility depend upon the prevention of the consummation of those plans. It refers to the report of Professor Ripley upon the consolidation of railroads, in which he discussed the advisability of joining the lines of the Western Maryland and the Pittsburgh & West Virginia by new construction, thus creating a new through route to Baltimore, to be made a part of a system of which the Delaware, Lackawanna & Western and the New York, Chicago & St. Louis would be the principal lines. Therefore, whether or not the proposed extension can be justified merely as an additional railroad facility without regard to its relationships, it must also be tested by its possible utility as a necessary link in a through transportation system connecting the eastern seaboard with the Middle West and competing with other systems serving those sections. The proposal raises the question as to whether the port of Baltimore should be served merely by two competitive systems, the Pennsylvania and the Baltimore & Ohio, or should be served also by a third system, competing with both the others. A representative of the Western Maryland attended the hearing, and upon request that company filed a profile of its line between Baltimore and Connellsville, showing grade and curvature, for comparison and for use in connection with similar information furnished by the applicant, the Wheeling & Lake Erie, the Pennsylvania, and the Baltimore & Ohio. Testimony was also adduced as to other characteristics of the lines thus compared, bearing particularly upon the capacity of the lines for additional traffic and for development.

Commissioner Eastman said in part:

The "two strongest arguments" above mentioned are really one, for unless the new line becomes part of a new and independent route so operated that it will attract through traffic from other routes, it will be of little avail in lessening the danger of congestion at Pittsburgh. But obviously the Pittsburgh & West Virginia cannot develop such a new through route unaided; it must have the help of friendly and cooperative connections at either end. On the west the connection is the Wheeling & Lake Erie, which is now in control of three trunk lines, two of which are here in active opposition to the applicant. On the east the connection is the Western Maryland, in which the Baltimore & Ohio, one of these opposing trunk lines, now has a large and probably dominating financial interest. So long as this situation continues to exist, it is inconceivable that the applicant would be justified in embarking upon the heavy expenditures involved in the construction of the new line. Whether or not the interests of the trunk lines in the Wheeling & Lake Erie and the Western Maryland involve a violation of the so-called Clayton Act is a question which we now have under consideration in formal proceedings which we have instituted. The determination of that question is manifestly of vital importance to the plans of the applicant, and hence it is vital to our findings here. I am unable to see how we can find that public convenience and necessity require the construction of a line which would be well nigh useless under conditions which now exist and which, so far as we now know, may perhaps persist.

Furthermore, quite apart from the considerations just mentioned, the record in this proceeding does not show any too clearly that a new and independent through route between Baltimore, the Pittsburgh district, Lake Erie, and points beyond is necessary or desirable in the public interest. I am quite prepared to believe that it is, but is that fact shown by this record? The shippers of Baltimore, the city which according to the majority has more to gain than any other from the new route, were conspicuous at the hearing by their absence. The same may be said of the shipping interests in the territory west of Pittsburgh. If they need a new and independent through route to and from Baltimore, they did nothing to enlighten us on that point. Indeed very little evidence was presented by shippers that might be concerned in the development of the new through route, save and except shippers in the Pittsburgh district located on or near the proposed connecting line.

I am inclined also to believe that the question raised as to this new and independent through route is more far-reaching than appears on the surface, and that it has an important bearing upon the much broader question of the proper grouping of the lines in eastern territory under any consolidation plan that may be formulated.

Looking Backward

Fifty Years Ago

The annual report of the Chicago, Rock Island & Pacific for the year ended on March 31, 1878, shows that the average rate for carrying freight was 1.56 cents per ton per mile. In the previous year the rate was 1.66 cents per ton per mile—*Railway Age,* June 27, 1878.

Competition between railways was illustrated in the height of its absurdity last week, when tickets from St. Louis to Indianapolis, a distance of 263 miles, were sold for 35 cents, the regular fare being $6. At the same time tickets were sold from St. Louis to Cincinnati for $2, the regular fare being about $8.—*Railway Age,* June 27, 1878.

The United States Supreme Court has handed down an opinion which upholds a decision of the court of claims which allowed the government a deduction of one-third from the published rates for transportation of property and troops over the lines of the Atchison, Topeka & Santa Fe. The land grant of the railroad provides that the Santa Fe shall forever be a public highway for the use of the government, the company contending that the use of the road was all that could be required of it while the government insisted that it was also entitled to transportation service without charge.—*Railroad Gazette,* June 28, 1878.

The Michigan Central election on June 24 resulted in the choice of the Vanderbilt ticket by a clear majority of the total stock. The change is a sweeping one, not one of the old board being left. William H. Vanderbilt now has direct control over the New York Central & Hudson River, the Lake Shore & Michigan Southern (both now parts of the New York Central), the Canada Southern and the Michigan Central through his election to the presidency of each of these railroads within the past two months. His system is now as nearly independent as it is practicable for any railway interest in this country to be and he has available a line from New York to Chicago with a four track railroad from Buffalo to Albany.—*Chicago Railway Review,* June 29, 1878.

Twenty-Five Years Ago

The prediction made a year ago that the crop of railroads awaiting foreclosure had nearly run out appears to be justified by the fact that during the past six months only three roads totaling 145 miles of line were sold under judgments. During the same period only five railroads with an aggregate mileage of 79 were placed in receivership.—*Railway Age,* July 3, 1903.

An inventory of citrus fruit lost in the recent floods in Kansas, shows that something more than 100 cars loaded with such freight are missing. The larger part of this loss occurred in the yards of the Atchison, Topeka & Santa Fe at Argentine, Kan. The same railroad moved 440 cars of merchandise to Florence, Kan., for the purpose of resorting their contents and cleaning such articles as were susceptible of salvage.—*Railway and Engineering Review,* June 27, 1903.

Ten Years Ago

A 10 per cent increase in interstate express rates was allowed by the Interstate Commerce Commission in a decision rendered on June 22, after an order had been issued denying the supplemental petition of the express companies for a 15 per cent increase in rates. The four companies which transact about 86 per cent of the total express business reported a deficit of $508,527 for 1917.—*Railway Age,* June 28, 1918.

The employment of girl apprentices in certain departments of the Santa Fe shops at Topeka, Kan., for work formerly done by yonng men, has proven sufficiently successful that the superintendent of shops plans to augment the force of 30 girls from time to time. For the period of the war it is planned to train women for the jobs of skilled workmen who have gone to the shipyards.—*Railway Review,* June 29, 1918.

New Books

Verkehrswerbung bei den Eisenbahnen, (The Merchandizing of Railway Transportation) by Dr. Adolf Sarter, 218 pages, illustrated. 5¾ in. by 8¼ in. Bound in paper. Published by Verkehrswissenschaftlichen Lehrmittelgeselschaft m.b.h. bei der Deutschen Reichsbahn, Berlin, Germany.

This book comprises an analysis of the merchandising of railway transportation with particular reference to the German National Railways. It discusses the need for modern selling methods in the light of competition with new modes of transportation such as motor vehicles and airplanes, and devotes considerable space to rates, sales organizations and advertising and is illustrated with reproductions of posters in color. The book suffers as a text for the American from the fact that it is highly colored by the economic conditions, geography, and the racial outlook which prevail in Europe. The continental fondness for poster display gives rise to one chapter on methods of presentation which is eminently worth while.

Books and Articles of Special Interest to Railroaders

(Compiled by Elizabeth Cullen, Reference Librarian, Bureau of Railway Economics, Washington, D. C.)

Books and Pamphlets

Principles of Inland Transportation, by Stuart R. Daggett. A survey of modern inland transport systems, i.e., inland waterways, highways, railroads, pipe lines, interurban, suburban and urban railways, and air routes, together with discussions of the character and direction of traffic on them, important problems of relations of them with shippers and the general public, and of problems and experience in England, France and Germany as well as the United States. Bibliography notable for the number of references to official documents, reports, and hearings. 705 p. Pub. by Harper & Brothers, New York City, $4.00.

Report No. 7 of the Commissioner for the German Railways, June 1, 1928. Includes brief history of the German Railway Company, analysis of reports for 1927 and comment on operating conditions, motor competition (p. 51-53) and air transport and rates (p. 53-57) 102 p. Pub. by Commissariat for the German Railways, Berlin, Germany.

Standards Yearbook 1928, compiled by The National Bureau of Standards. Its Miscellaneous Publication No. 83 discussing the scope of standardization, international, national, federal, municipal, county and state agencies, general standardizing agencies and the standardizing activities of technical societies (such as the railway associations, p. 275-278, 293, 294, 316) and trade associations. Bibliography, p. 353-372. 399 p. Pub. by U. S. Govt. Print. Off., Washington, D. C., $1.00

Periodical Articles

Farthest North by Railway—The Story of Canada's New Line to Hudson Bay, by Lewis R. Freeman. An illustrated and map-accompanied article on the present plans for the reconstruction and completion of the Hudson Bay Railway. World's Work, July 1928, p. 306-315.

Hill Country, V, by Ramsey Benson. Further installment of prize novel based on the life of James J. Hill. Forum, July 1928, p. 137-150.

Les Impôts Sur Les Transports Et Les Majorations Des Tarifs Des Chemins De Fer, by C. Colson. The railroad rate and tax crisis in France. Revue Politique et Parlementaire, June 10, 1928, p. 349-371.

New Locomotives, Kenya and Uganda Railway, "The engines [2-8-2 type] are to run on a metre gauge railway, and are the heaviest non-articulated locomotives that have yet been constructed for this gauge." p. 198. Illustrated. Journal of the Institute of Locomotive Engineers, March-April 1928, p. 198-200.

Odds & Ends

"Bobby" Jones, Railway Man

It may be of interest to railway golfers to know that, among their number, is one of the best and certainly the most famous golfer in the world. Robert Tyre Jones, better known as "Bobby," is one of the local attorneys for a southeastern railway at Atlanta. Despite the fact that there are many railway men who shoot a creditable game, it is thought that Mr. Jones can claim the railway golf championship without the formality of playing through a tournament.

A Grand Old Man

John D. Moore, age 81, attended the superintendents' convention at Memphis on June 12. John is a farmer, living near Helena, Ark., now, and settled down, but he was not always engaged in such a peaceful occupation. After 62 years of railroading, he retired as assistant superintendent of the Missouri Pacific last fall to take up agriculture. John got into the game in 1866 as a mule-driver on a Union Pacific construction gang. At that time, the railhead was 160 miles west of Omaha. During the palmy days of the old Wild West, John knew most of the famous heroes of the day. Among others, "Buffalo Bill" Cody and "Wild Bill" Hickock, were his intimate friends.

Champs!

The rigors of northern winters seem to have preserved the spirit of youth among Great Northern officials. This is indicated by the winning of a league championship in St. Paul for the season just ended by the Great Northern volley ball team. The team is composed of George H. Hess, Jr., comptroller, W. R. Wood, mechanical engineer, J. U. Haley, valuation accountant, V. W. Wahlberg, engineer accountant, Thoms Balmer, assistant general counsel, J. H. Kaufmann, auditor insurance bureau, E. C. Lewis, freight claim agent, W. G. Reed, accountant miscellaneous companies, C. F. Cartelheim, auditor freight receipts and J. C. Seiberlich, general accountant.

Longest Fixed Departure Time?

After running for 8 or 10 years at the departure times of 9 a. m., 9:15 a. m., and 9:30 a. m., it was in June, 1862, that the first "Flying Scotsman" of the London & North Eastern left platform No. 10 at King's Cross, and, apart from a temporary departure 30 min. earlier during the later war days, the "senior" Scotsman has left at 10 a. m., for Edinburgh for 66 years, thus achieving the longest continuous record for unaltered departure time of any express train in the world. The "junior" train in the opposite direction has not quite such a wonderful record, for it was not until 1876 that the time of departure from Edinburgh (Waverley) was fixed definitely and finally at 10 a. m. Thus the "up" Scotsman is the junior by 14 years.—*Railway Gazette.*

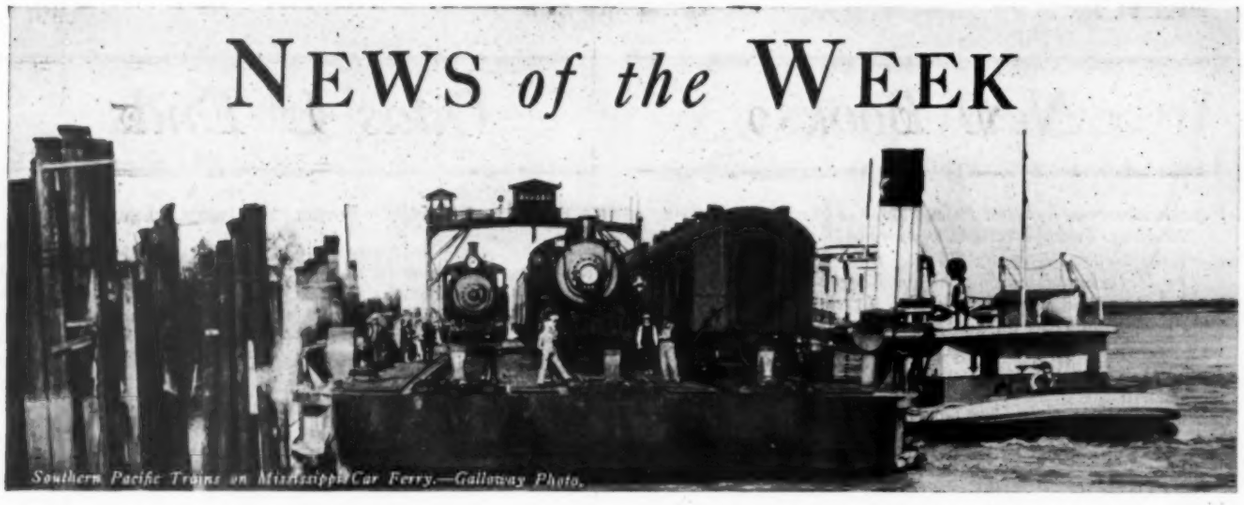
Empties Coming Back

Here's a verse by S. P. Huntley, that appeared in the Chicago Daily News some time ago, that keeps recurring to any one who reads it:

Have you ever sat by the railroad track,
And watched the empties coming back?
Lumbering along, with a groan and a whine,
Smoke strung out in a long, gray line,
Belched from the panting engine's stack,
Just empties coming back?

I have, and to me the empties seem,
Like the dreams I sometimes dream,
Of a girl, or money, or maybe fame,
My dreams have all returned the same,
Swinging along the homebound track,
Just empties coming back.

NEWS *of the* WEEK



Southern Pacific Trains on Mississippi Car Ferry.—Galloway Photo.

THE WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY'S telephone apparatus for wireless communication between the rear and the front ends of long freight trains is being tested by the Pennsylvania between Altoona and Pittsburgh.

REPRESENTATIVES of the four train-service brotherhoods on the Kansas City, Mexico & Orient, at a meeting in Wichita, Kan., on June 15, decided that, pending the approval of the acquisition of that railroad by the Atchison, Topeka & Santa Fe, the proposed strike for higher wages would be postponed indefinitely.

THE RAILROAD COMMISSION OF TEXAS, in its annual report for 1927, recommends the adoption by the state legislature of a 10-year program for the elimination of grade crossings on traveled highways in Texas. During 1927, 272 grade crossing accidents in Texas resulted in the death of 105 persons and the injury of 350.

A LONE BANDIT held up an express car on a New York Central train enroute from Detroit, Mich., to Toledo, Ohio, near Blissfield, Mich., on June 23 and escaped with a small amount of money and securities. The robber, who was believed to have boarded the train at Adrian, Mich., forced the express messenger to open the safe for him.

THE LOUISIANA & ARKANSAS and the Louisiana Railway & Navigation Company, have been acquired by H. C. Couch and associates, and pending Interstate Commerce Commission approval of the merger of the companies the general offices of the former railroad have been moved to Shreveport, La. Executive, traffic and purchasing officers of the Louisiana & Arkansas who have been located at Texarkana, Ark., are now at Shreveport.

Veterans Celebrate

The twenty-fifth anniversary of the first association of veteran railway employees was celebrated June 17, at the Young Men's Christian Association, 309 Park Avenue, New York City (Grand Central Terminal), by a large meeting, at which there were present representatives of a large number of such associations. The Veteran Association of the Central of New Jersey is said to have been the first one established (1903) and W. G. Besler, chairman of the board of directors of that road, presided at the meeting. Among the speakers introduced by Mr. Besler was Joseph K. Chapman of Hornell, N. Y., 92 years old, who is said to have been in the employ of the Erie Railroad over 73 years.

Locomotives in Need of Repair Decrease

Locomotives in need of repair on the Class I railroads on June 1 totalled 8,421 or 14.1 per cent of the number on line, according to reports filed by the carriers with the Car Service Division. This was a decrease of 682 locomotives compared with the number in need of such repairs on May 15, at which time there were 9,103 or 15.2 per cent.

Locomotives in need of classified repairs on June 1 totaled 4,672 or 7.8 per cent, a decrease of 342 compared with May 15, while 3,749 or 6.3 per cent were in need of running repairs, a decrease of 340 compared with the number in need of such repairs on May 15. Class I railroads on June 1 had 7,161 serviceable locomotives in storage compared with 6,912 on May 15.

Adopt Definition of Dense Yellow Pine

A definition of dense long leaf pine, which incorporates the idea of the yellow pine density rule, was adopted by the Southern Pine Association at New Orleans on June 19, it being the idea that such a definition would insure to purchasers the quality of product they desire when calling for long leaf pine. The definition is as follows:

"Long leaf dense pine timber and dimension shall be timber and dimension manufactured from long leaf pine trees and shall show not less than six annual rings to the inch and contain not less than one-third summer wood (measured in accordance with the density rule). Evidence of species shall be furnished by the manufacturer in the form of a grade mark on each piece or by a certificate upon demand."

Wage Statistics for March

The number of employees reported to the Interstate Commerce Commission by Class I railroads as of the middle of March was 1,626,407, and their total compensation was $237,634,118. Compared with the returns for the corresponding month of last year the summary for March shows for every reporting group a decrease in the number of employees and in the average number of hours of all employees per working day. The total number decreased 104,254, or 6.02 per cent. The total compensation decreased 4.82 per cent.

Los Angeles Station Order Protested

The Atchison, Topeka & Santa Fe, the Los Angeles & Salt Lake and the Southern Pacific have filed separate requests with the California Supreme Court at San Francisco, Cal., for a writ of review of the standing order of the California Railroad Commission under which public convenience and necessity are held to demand the construction of a union passenger station on the Plaza site in Los Angeles, Cal. The railroads contend that the state railroad commission acted without jurisdiction in issuing the order, that its findings were not supported by the evidence and that compulsory construction of the station would be equivalent to the confiscation of property without due process of law. No evidence was introduced during the hearings before the railroad commission showing that present facilities are inadequate. It is charged that the commission has failed to decide the fundamental issue, that of the elimination of grade crossings in Los Angeles.

Pullman Safety Campaign

The fourth annual safety drive for no accidents in May conducted by officers and employees of the Pullman Company, as described in the *Railway Age* of May 19, page 1172, has established a new record for the company. During May 27,059 employees worked 6,614,369 hours and lost approximately 960 hours through injuries to 10 employees. Four of the injured were car cleaners and the re-

mainder porters. Railroad mishaps were responsible for two accidents, while the others were due to the employees' own negligence. In May, 1927, there were 31 lost-time accidents among employees, as compared with ten for May, 1928, a reduction of approximately 70 per cent.

The 27,059 employees engaged in the May, 1928 campaign include all Pullman conductors, porters and maids of the 90 districts and agencies in the United States, Canada and Mexico; the 276 railroad cleaning yards; the six Pullman repair shops, at Calumet, Ill., St. Louis, Mo., Buffalo N. Y., Richmond Cal., Atlanta, Ga., and Wilmington, Del., and the six laundries at Kansas City, Mo., Cincinnati, Ohio; Miami, Fla., Tampa, Fla., Oakland, Cal., and Washington. The 10 accidents are chargeable against seven districts, neither the repair shops nor the laundries having a lost-time mishap.

An Apparel Mart in Chicago

The Illinois Central has completed negotiations with the Apparel Manufacturers' Mart Building Corporation for the lease of air rights to two blocks of land on the south bank of the Chicago river just east of Michigan avenue, Chicago, for the construction of a 75-story mart to be occupied by apparel manufacturers. This building, which will cost about $45,000,000 will be 845 ft. high, will have a floor space of 4,650,000 sq. ft., and will be the largest building in the world.

Besides shops, offices and display rooms it is planned to include in the building a 1,000-room hotel, a 1,200 car garage, three sets of club rooms, two auditoriums, each three stories in height, capable of seating 2,500 and 1,200 persons, and an open-air roof swimming pool. The building will span a street which divides the two blocks serving as its site. The hotel will occupy the space between the 47th and 70th floors.

The air-right lease with the Illinois Central is for 100 years and includes the right to construct caissons for foundations and five subbasements. This is the third air-right lease or sale that has been negotiated this year by Chicago railroads, the others being those of the Marshall Field Merchandise Mart over the Chicago & North Western and the Chicago Daily News Building over the tracks of the Chicago Union Station Company.

This construction will make necessary the removal of a grain elevator which now stands on the site. The Illinois Central will retain trackage rights under the building proper and enough space for the construction of a new inbound l. c. l. freight station. Shipments from and to tenants of the Apparel Mart will be handled in this station. The cost of the railroad's construction involved in the project will be about $1,000,000.

The general contract for construction of the building has been awarded to the Starrett Building Company, Chicago, with the proviso that the work shall be completed within 15 months from the start of construction. It is planned to apply to the Illinois Commerce Commission for approval of the air-right lease about September 1.

Grade Crossings in Syracuse

The plan for elimination of grade crossings on the New York Central in Syracuse, N. Y., which has been the subject of study by a special commission for several years, has now been laid before the Public Service Commission at Albany and that body will hold a public hearing on it in the court house at Syracuse on July 12. The estimated cost of carrying out the whole scheme is $20,000,000 and the plan includes the construction of a new passenger station on West Genesee Street. The chairman of the special Syracuse grade crossing commission is H. H. S. Handy.

First Locomotive in Canada

The first locomotive to run in Canada was the "Dorchester", a 2-4-0 engine with a four-wheel tender, built by Robert Stephenson & Company, Newcastle-on-Tyne, England, and the first trip, one of 14 miles, was made on July 21, 1836, on the line from Laprairie, southward to St. Johns, Que., which now is a part of the Canadian National.

This statement comes from the Canadian National Railways Magazine for June, which has been investigating early history by way of refuting statements which have appeared repeatedly in various publications to the effect that the first run of a locomotive in Canada was in 1837. The data now quoted comes from a Montreal newspaper of 1836. The name of the road at that time was the Champlain & St. Lawrence.

Senator G. C. Dessaulles of St. Hyacinthe, Que., now over 100 years old, was present, with his uncle, and took a ride on the first train, (July, 1836).

The magazine prints a half-tone photographic reproduction of a drawing of the "Dorchester" based, not on the original drawing, but on dimensions found in certain publications.

Lift Truck Standards Formulated

Standards of dimensions for hand and electric lift trucks were formulated at a preliminary conference of manufacturers of these products, recently held under the auspices of the Division of Simplified Practice, Department of Commerce.

The conference adopted two heights for lift truck platforms, in the low position, as follows: 7 in. high and 11 in. high.

A maximum width of 27 in. for the lift truck platform was adopted as standard. It was voted that the minimum clearance between the under side of skid platforms and the top of lift truck platforms be ¾ inch. After discussion in regard to the establishment of standard lengths of truck platforms, the conference voted to lay this matter on the table until after the question of skid sizes has been acted upon by other interests.

The conference requested the Division of Simplified Practice to call a general conference of manufacturers and organized users on June 28, at which time the above approved recommendation of the manufacturers will be presented for formal approval.

Traffic

The Alton Transportation Company, subsidiary of the Chicago & Alton, has been authorized by the Illinois Commerce Commission to operate motor coaches between Joliet, Ill., and Carlinville, about 198 miles.

The St. Louis-San Francisco established freight service over its extension from Amory, Miss., to Pensacola, Fla., on June 18 when a freight train called the "Lindbergh" was operated from Amory southbound and another named the "Spirit of St. Louis" was operated from Pensacola northbound.

On the Chesapeake & Ohio, Trains 4 and 5, between Washington, D. C., and Cincinnati, Ohio, and the connecting trains, 44 and 45, between Newport News, Va., and Gordonsville, have been named "The Kentuckian"; and Trains 1 and 6, between Washington and Cincinnati, and connecting trains between Newport News and Gordonsville, will be known as the "West Virginian."

The Interstate Commerce Commission has assigned Part 3 of its rate structure investigation, relating to rates on cotton, for hearing at Oklahoma City on July 18 before Examiner Mattingly pursuant to request of counsel for the Oklahoma Corporation Commission for a hearing in Oklahoma for rebuttal on the testimony of carriers dealing with the question of "the existing depression in agriculture" under the Hoch-Smith resolution.

The St. Louis-San Francisco has moved 2,460 cars of strawberries this year thereby establishing a new record. The largest previous movement occurred in 1922 and when 2,117 cars were handled. The season's shipments were divided between 1,475 cars moving by freight, and 892 by express, the balance being handled in less than carload shipments. As in past seasons the strawberries were distributed to almost every state in the union, with a particularly heavy movement to Canada. The main points of origin included Sarcoxie, Mo., with 326 cars, Springdale, Ark., 206 cars and Monett, Mo., 194 cars.

The New York division of the Pennsylvania reports having made a new freight train record in the month of May, when 5,001 was the average daily number of freight cars passing Monmouth Junction, which is treated as the pivotal point on the division. On this division, which is a very busy four-track line of 90 miles, with a few short branches, the total number of passenger trains operated in May was 18,935. Another record reported by this division was the unloading on the night of May 28, of 564 cars of perishable freight at the piers, New York, (Piers 27, 28 and 29, North River) which are devoted to that traffic. All cars are delivered to this station by float from the west side of the Hudson

River. The arrivals at this station in May totaled 1,531 more cars than in any previous May.

A. W. Mellon, secretary of the Treasury, denying reports that the railroads have been called upon to take special measures concerning liquor brought into this country from Canada, says that the recent conference at Buffalo, in which officers of the customs department conferred with railroad representatives, had to do specifically with smuggling. The principal difficulty specified in Mr. Mellon's statement is in connection with cars originating in Canada to which have been attached blue seals indicating that the contents of the cars came from points in the United States (through Canada) and, therefore, need not be examined. These blue seals have been obtained by smugglers through bribery, theft or forgery and they have thus been enabled to get their cars across the line without having them opened. Another principal difficulty is with carload shipments from Canada of which the billing is changed after reaching this country so that the car arrives at a destination where customs authorities cannot examine it.

Freight Traffic

The volume of freight handled by the Class I railroads in the first four months of 1928 amounted to 147,296,210,000 net ton-miles, according to a compilation by the Bureau of Railway Economics. This was a decrease of 5.2 per cent, below the total for the corresponding period last year. In the Eastern District the decrease was 10.1 per cent, and in the Southern it was 7.7 per cent, while the Western district reported an increase of 3.4 per cent.

In April, the freight handled amounted to 35,866,377,000 net ton-miles, a decrease of 3.4 per cent below that of April 1927. April in the Eastern district, showed a decrease of 6.5 per cent and the Southern district a decrease of 9.8 per cent. The Western district reported an increase of 4.3 per cent.

The average daily movement per freight car in April was 29.9 miles, the highest for any April on record and an increase of 0.4 mile above that of the same month in 1927. The average load per car in April was 25.6 tons. This was a decrease of 0.6 ton under the average for the same month last year.

Automobiles at Long Island Stations

The Long Island Railroad has posted at most of its stations notices to the effect that the parking of automobiles on the station grounds must be limited to 30 minutes. Congestion has led to considerable inconvenience, especially at stations where railroad property has been occupied by parties not patronizing the road; and R. K. Rochester, general manager, has issued a circular asking the cooperation of the railroad's patrons in the observance of the regulation. Large numbers of automobiles have been left on the station property from early morning until afternoon or evening.

Equipment and Supplies

Locomotives

THE SAGINAW LOGGING COMPANY has ordered 1, 2-8-8-2 type locomotive from the Baldwin Locomotive Works.

THE INTERNATIONAL RAILWAYS OF CENTRAL AMERICA has ordered 4, 2-8-2 type locomotives from the Baldwin Locomotive Works.

THE CHICAGO & ILLINOIS MIDLAND has ordered 1 locomotive of the 4-4-0 type from the Baldwin Locomotive Works. This road was reported as inquiring for 2 Mikado type locomotives in the *Railway Age* issue of June 9.

Freight Cars

M. H. TREADWELL & Co. is inquiring for 1 flat car.

THE CITIES SERVICE COMPANY, New York, is inquiring for 4 tank cars; 2 of 3,600 gallons and 2 of 4,500 gallons capacity.

THE COMMONWEALTH EDISON COMPANY is inquiring for 1 transformer car.

THE CHICAGO, MILWAUKEE, ST. PAUL & PACIFIC has ordered 2 special flat cars of 100 ton capacity from the Standard Steel Car Co.

THE ERIE has ordered 100 steel furniture cars from the Magor Car Company. Inquiry for this equipment was reported in the *Railway Age* issue of April 28.

THE NORFOLK & WESTERN will rebuild, at its Roanoke shop, 500, 90-ton all-steel gondola cars. These are in addition to the 250 cars of similar type for which rebuilding plans were reported in the *Railway Age* issue of Jan. 28.

Signaling

THE SOUTHERN PACIFIC has ordered from the General Railway Signal Company materials for an electric interlocking at Houston, Tex.; 27 working levers.

THE BALTIMORE & OHIO is planning to install automatic color-position-light signals on its line between Grafton, W. Va., and Parkersburg, 104 miles.

THE LOUISVILLE, HENDERSON & ST. LOUIS has ordered from the Union Switch & Signal Company material for automatic block signals—the A. B. P. system—on its line between Stephensport, Ky., and Strawberry; and also material for additions to the interlocking at West Point, Ky.

THE BOSTON & MAINE has contracted with the Union Switch & Signal Company for revising the signaling of its line through the Hoosac Tunnel, (North Adams, Mass.) five miles of double track and including also one and one-half miles of three-track line west of the tunnel. All of these tracks are to be signaled for the movement of trains in either direction. Interlockings will be electro-mechanical.

Iron & Steel

THE KANSAS CITY SOUTHERN and the HOUSTON & SHREVEPORT have ordered 300 tons of structural steel for an overpass at Shreveport, La., from the Orange Car & Steel Company.

Supply Trade

The Zapon Company, manufacturing chemists, Stamford, Conn., owned by Richards & Co., Inc., has acquired **The Duratex Corporation** of Newark, N. J.

Charles A. Terry, vice-president of the **Westinghouse Electric & Manufacturing Co.,** has been elected to the directorship of that company left vacant by the death of General Guy E. Tripp.

The Curtin-Howe Corporation, wood preserving engineers, New York City, announce the appointment of **Kenneth M. Bailey** as technical sales representative, with office at 515 N. O. Bank building, New Orleans, La.

Blaine S. Smith, vice-president of the **Universal Portland Cement Company** has resigned to become president of the **Pennsylvania-Dixie Cement Corporation,** succeeding **John A. Miller,** who becomes chairman of the Board.

O. H. Davidson, president of the O. H. Davidson Equipment Company, Denver, Colo., has been appointed district manager in the Rocky Mountain territory by the **Oliver Iron and Steel Corporation** of Pittsburgh, Pa. Mr. Davidson will represent the bolt, nut, rivet and pole line material departments of Oliver.

The Roller-Smith Company, New York, announces recent sales organization changes involving the appointment of **John A. Coleman,** Houston, Tex., to handle the Texas territory and the assignment of **H. T. Weeks,** Denver, Colo., to a territory embracing Colorado, Utah, Wyoming and northern New Mexico.

Henry Gardner, formerly consulting engineer with the **Steamotor Company** of Chicago, has become associated with **The Comtor Company,** Waltham, Mass., as vice-president in charge of sales. He will be engaged in introducing the "Comtor System." Mr. Gardner is a graduate of the Massachusetts Institute

of Technology and for a number of years held the position of special mechanical engineer on the Baltimore & Ohio.

The Isothermos Corporation of America has been formed to manufacture to American standards the "Isothermos" journal box, now in use on European African and South American railroads. The Isothermos journal box has an automatic lubrication system. The executive offices of the American company are at 11 West 42nd street, New York. The officers and directors of the new corporation are: Hubert E. Rogers, president, Rogers & Whitaker, New York; A. De Bac, vice-president, chairman of the Societe Internationale Isothermos, Geneva, Switzerland; Dr. F. H. Hirschland, treasurer, president, Metal & Thermit Corporation, New York; Spier Whitaker, Rogers & Whitaker, New York; and Geo. Grandjean, director, de la Banque Francaise de l'Afrique, Paris, France.

James Cleary has been appointed general sales manager of **Combustion Engineering Corporation,** New York. Mr. Cleary has been engaged in engineering and sales work for over 25 years. He served with the Westinghouse Church Kerr Company as erecting and operating engineer and later in the same capacity in England. Mr. Cleary then became associated with the Westinghouse Machine Company. In the Spanish American War, he served as chief machinist and warrant officer and during the World War was in charge of the steam equipment of the Old Hickory government plant. Since 1921 Mr. Cleary has been connected with the Combustion Engineering Corporation consecutively as district manager of the Philadelphia and Detroit offices and for the past two years as assistant general sales manager.

C. O. Holmes and **W. T. Corbett,** who have been appointed vice-presidents of the **United States Steel Products Company,** export subsidiary of the United States Steel Corporation, have been connected with that concern for several years.

Mr. Holmes who was born at Auburn, New York, in 1874 was graduated from Williams College with the class of 1896. On leaving college he entered the employ of D. M. Osborne & Company of Auburn, (now part of the International Harvester Company) and remained with that company until January 1, 1898, when he became associated with the sales department of Carnegie Steel Company, Pittsburgh. With the organization of the United States Steel Products Company, Mr. Holmes was transferred to this subsidiary in New York, and has since been continuously with that company. At the time of his election to the vice-presidency, Mr. Holmes was manager of the structural steel department.

Mr. Corbett was born in Philadelphia 51 years ago, and was educated in the public schools of Cutler, Maine, and Rockville Center, N. Y. He has been employed by subsidiary companies of the United States Steel Corporation for 33 years and for 25 years has been manager of the rail department of the United States Steel Products Company.

Obituary

Frederick Huntington Parke, general engineer of the **Westinghouse Air Brake Company,** Wilmerding, Pa., died suddenly on June 16th. Mr. Parke received his early education at St. John's school in Manlius, N. Y., and later entered Cornell University, where he was graduated as a mechanical engineer in the class of 1892. Immediately after his graduation he became connected with the Westinghouse Machine Company at East Pittsburgh, remaining with that

Frederick Huntington Parke

organization until 1898, when he entered the employ of the Westinghouse Air Brake Company. Soon he was sent to Russia to assist in the construction of the air brake plant at St. Petersburg and in the formation of the engineering organization. He remained in Russia until 1902 when he returned to Pittsburgh. Since then he has been connected with the engineering department at the Wilmerding works. Mr. Parke was a member of the Engineers Society of Western Pennsylvania, a member of the Pittsburgh Railway Club and secretary also of the Pittsburgh Air Brake Club.

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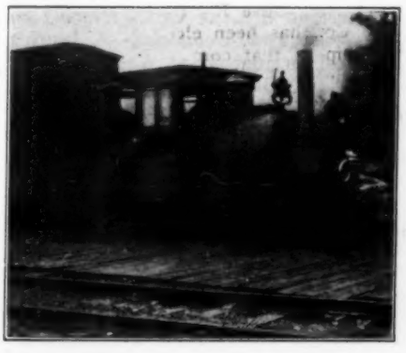


Half the Motive Power on the Huntsville & Lake of Bays, a One Mile Line in Ontario, Canada

Construction

ATCHISON, TOPEKA & SANTA FE.—The Board of Aldermen of St. Louis, Mo., on June 20 approved a bill vacating certain portions of Poplar and Sixteenth streets in that city to provide a site for a freight terminal building. In exchange for the streets vacated the Santa Fe has agreed to turn over to the city a strip of ground for street purposes. According to the bill the railroad must start construction within two years and must finish construction within five years.

BALTIMORE & OHIO.—This road has let a contract to the Ferro Construction Company, Chicago, Ill., for erecting superstructures for bridges in connection with track elevation work at Philadelphia, Pa. This project will cost about $26,000.

GRAND TRUNK WESTERN (Detroit, Grand Haven & Milwaukee).—A contract for the construction of 9 miles of new double track line between Royal Oak, Mich., and Birmingham, has been awarded to the Nelson Construction Company, Chicago, at a cost of $587,000.

MISSOURI PACIFIC.—A contract has been awarded to the List and Weatherly Construction Company, Kansas City, Mo., for the construction of four sheep pens and accompanying chutes, a grain elevator, a feed mixing plant and an office building at Dodson, Mo., at a cost of about $400,000. Three of the pens will have outside dimensions of 130 ft. by 1,000 ft. and one pen will have dimensions of 400 ft. by 600 ft. These pens will replace the present sheep pens which are located at Leeds, Mo., and will be abandoned.

OREGON SHORT LINE.—A contract has been let to the Utah Construction Company, Ogden, Utah, for grading in connection with the construction of second main track between Ticeska, Idaho and King Hill, 10 miles, at a cost of $225,000. The total cost of this project is estimated at $675,000.

STANDARD LUMBER MILLS.—Forces of this company will construct a logging railroad from Snowflake, Ariz., to a point 11 miles distant. Connection will be made with the Apache railway at Snowflake.

SACRAMENTO NORTHERN.—A contract for the construction of the Holland branch, which will leave the main line at Riverview, Cal., and will extend about 13 miles south from that point, has been awarded to Morrison-Knudsen, Boise, Idaho, at a cost of about $800,000.

SOUTHERN PACIFIC.—This company has applied to the Interstate Commerce Commission for authority to construct a line of 9.5 miles between Martinez and Goodyear, Calif., to be used in lieu of the existing car ferries between Port Costa and Benicia, which it is proposed to abandon.

Financial

ALABAMA & WESTERN FLORIDA.—*Operation.*—This company has applied to the Interstate Commerce Commission for a certificate authorizing it to operate in interstate commerce its line from Chipley to Southport, Fla., 38 miles.

ATCHISON, TOPEKA & SANTA FE.—*Bonds.*—This company has applied to the Interstate Commerce Commission for authority to issue $14,691,000 of 4½ per cent bonds under the California-Arizona Lines first and refunding mortgage, and to sell them at not less than par and interest.

DELAWARE & HUDSON.—*Transfer of Properties.*—Transfer of all the company's properties, except stock of any anthracite companies, for such consideration in cash or in stocks or other securities of the purchasing corporation as the managers may approve, has been authorized by a vote of stockholders of the Delaware & Hudson, to take effect not later than May 8, 1931. The transfer is to be made to a new corporation to be organized under the State of New York.

KANSAS CITY SOUTHERN.—*Lease.*—The Interstate Commerce Commission has authorized this company to acquire control of the Kansas City & Grandview, under lease, and to guaranty as to principal and interest an issue of $3,000,000 of first mortgage bonds by the Kansas City & Grandview, to be sold at not less than 96.05 and interest, and the proceeds used to finance the cost of constructing 13.24 miles of line from Leeds to Grandview, Mo.

LOUISVILLE, HENDERSON & ST. LOUIS.—*Stockholders Approve Lease.*—Plans to lease this railroad for 99 years to the Louisville & Nashville were agreed upon by the stockholders of the former railroad at a special meeting at Louisville, Ky., on June 6. The action followed a recommendation by the board of directors that the lease be granted on the terms of a guarantee of 8 per cent dividends on all stock. At the present time the Louisville & Nashville owns about 85 per cent of the preferred stock and about 95 per cent of the common stock of this railroad.

PENNSYLVANIA.—*Proposed Lease of Tunnel & Terminal Railroad.*—This company has applied to the Interstate Commerce Commission for authority to lease for 999 years the property of the Pennsylvania Tunnel & Terminal, which owns much of the New York terminal property, paying as a rental an amount to cover interest on the bonds, organization expenses and 5 per cent on the outstanding capital stock of the terminal company, which now amounts to $50,000,000. The lease is described in the application as being in furtherance of the policy to secure unity of operation and management of the railroad properties which are a part of the Pennsylvania Railroad System.

READING.—*Lease.*—This company has applied to the Interstate Commerce Commission for authority to lease for ten years from October 1, 1927, the Mount Carmel Railroad, which has been operated under lease by the Reading and the Philadelphia & Reading for the past twenty years.

RUTLAND.—*Minority Interests.*—A committee of four, comprising James B. Mabon of Mabon & Co., H. O. Baker of Jessup & Lamont, Lucius Wilmerding of Gray & Wilmerding and G. B. Buchanan of Vernon C. Brown & Co., has been formed to protect interests of minority stockholders of the Rutland.

SEABOARD AIR LINE.—*Interest on Bonds.*—This road passed payment of 2½ per cent interest due June 21 on its issue of $25,000,000 adjustment 5 per cent income bonds. Accumulation on the bonds now amounts to 15 per cent. Robert L. Nutt, chairman of the board, stated that the Seaboard's income has been affected by a general recession in business throughout the country which began early in 1927 although it has affected the Seaboard to a smaller extent than it has some railroads.

TENNESSEE & NORTH CAROLINA.—*Acquisition.* — The Interstate Commerce Commission has authorized this company to acquire and operate a line from Andrews to Hayesville, N. C., 24.84 miles, formerly owned by the Valley River Southern.

TERMINAL RAILROAD ASSOCIATION OF ST. LOUIS.—*Bonds.*—The Interstate Commerce Commission has authorized this company to issue $7,000,000 of 4½ per cent refunding and improvement mortgage bonds, to be sold at not less than 97 and interest, for the purpose of retiring bonds which will mature in 1929.

WHEELING & LAKE ERIE.—*Bonds.*—The Interstate Commerce Commission has authorized this company to issue $894,000 of refunding mortgage bonds, series B, to be sold at not less than 99.5 and interest, the proceeds to be used to take up certain underlying bonds.

WHEELING & LAKE ERIE.—*Hearing on Anti-Trust Law Complaint.*—A hearing was held on June 25 at Washington before C. V. Burnside, assistant director of the Bureau of Finance of the Interstate Commerce Commission, in connection with the complaint issued by the commission against the Baltimore & Ohio, New York Central, and New York, Chicago & St. Louis alleging violation of the Clayton law in acquiring stock of the Wheeling & Lake Erie without the approval of the commission. The hearing brought out little that had not been developed at the previous hearings on the applications of officers and directors of the three trunk lines for authority to serve as directors of the Wheeling company, which were denied by the commission. Mr. Burnside stated that the previous record could be referred to in briefs and argument and the testimony taken was largely supplemental of the record already taken. W. M. Duncan, chairman of the board of the Wheeling & Lake Erie, and George Durham, vice-president and general manager, in reply to questions by Clyde Brown, general solicitor of the New York Central, testified that no attempt had been made by any of the three trunk lines or their officers to influence the action of the Wheeling management or to suppress competition between it and their lines. Mr. Duncan also referred to the statement in the commission's decision in the Pittsburgh & West Virginia case that the action of the Wheeling company in intervening in opposition to the P. & W. V. extension may have been influenced by the trunk line control, saying that it had acted independently and because it was well known that the Wheeling's interest does not lie in putting its business through the Pittsburgh gateway and it did not want the line built on the theory that the Wheeling could use it. Traffic officers of the P. & W. V. gave additional testimony designed to show the amount of the traffic handled by the W. & L. E. which was competitive with the other roads and expressed the opinion that the effect of trunk line control of the road would be to lessen competition substantially. They said, on cross-examination, that they had not observed any effects as yet of that character, but R. M. Paisley, general freight and passenger agent, said he did not understand that they had as yet actually assumed control of the Wheeling company. C. F. Taplin, general counsel of the P. & W. V., asked that the Nickel Plate be required to furnish information as to the amount of stock in the Chesapeake & Ohio, Pere Marquette and Erie by it, or its stockholders or any of the various corporations representing the Van Sweringen interests, with the idea, he said, of showing that the "ultimate control" of those roads is in the same group.

Valuation Reports

The Interstate Commerce Commission has issued final valuation reports finding the final value for rate-making purposes of the property owned and used for common-carrier purposes, as of the respective valuation dates, as follows:

Midland Valley	$10,750,000	1919
Utah	5,110,000	1919
Sumpter Valley	1,609,745	1916

Dividends Declared

Allegheny & Western.—3 per cent, payable July 2 to holders of record June 21.

Kansas City Southern.—Preferred, 1 per cent, quarterly, payable July 16 to holders of record June 30.

Northern Pacific.—1¼ per cent, quarterly, payable August 1 to holders of record June 29.

Average Prices of Stocks and of Bonds

	June 26	Last week	Last year
Average price of 20 representative railway stocks.	117.63	115.49	111.75
Average price of 20 representative railway bonds..	93.91	94.28	93.63

Officers

Pennsylvania Makes Number of Appointments

The Pennsylvania has made a number of changes in the staff of the road in Pittsburgh and the Pittsburgh district. Henceforth the Pennsylvania will be represented in Pittsburgh and its surrounding territory by two executives of vice-presidential rank. Other changes have been made, affecting the road's official staff at other centers, including Philadelphia, New York, Detroit, Chicago and also on the Long Island. **E. T. Whiter,** now regional vice-president in charge of the Central region, with headquarters at Pittsburgh, has been appointed to the new position of vice-president at Pittsburgh. Mr. Whiter will be relieved of the administrative duties in connection with physical operation, thus permitting him to devote his entire attention to matters involved in the relations between the Company and the large industries and population served by its lines in the Pittsburgh territory. **E. W. Smith,** now general manager of the Eastern region at Philadelphia, will succeed Mr. Whiter in the administrative work involved in carrying on operations in the Central region. He will have jurisdiction over the entire region and will devote his time to handling traffic at Pittsburgh and the surrounding region. **R. K. Rochester,** general manager of the Long Island, will succeed Mr. Smith as general manager of the Eastern region. He will in turn be succeeded by **J. F. Patterson,** general superintendent of the Eastern Ohio division at Pittsburgh. **N. B. Pitcairn,** superintendent of the New York division has been appointed general superintendent of the Eastern Ohio division, succeeding Mr. Patterson. **D. Y. Geddes,** superintendent of the Panhandle division, will succeed Mr. Pitcairn as superintendent of the New York division. **T. C. Herbert,** superintendent of the Monongahela division has been transferred in the same capacity to the Panhandle division, replacing Mr. Geddes. **H. T. Frushour,** division engineer on the Cleveland division has been appointed superintendent of the Monongahela division. **J. F. Deasy,** chief of freight transportation at Philadelphia, has been appointed assistant vice-president in charge of operation. He will assist M. W. Clement, operating vice-president. **J. R. Downes,** superintendent of freight transportation, Central region, succeeds Mr. Deasy as chief of freight transportation, and he will in turn be succeeded by **W. R. Triem,** superintendent of the Buffalo division. **E. E. Ernest,** freight trainmaster on the Maryland division has been appointed superintendent of the Buffalo division, replacing Mr. Triem. **J. E. Weller,** traffic manager of the Western region, has been promoted to the newly created position of assistant vice-president in charge of traffic, with headquarters at Chicago. **S. T. Stackpole,** general agent at Detroit will succeed Mr. Weller. **Colonel W. S. Franklin** will succeed Mr. Stackpole as general agent at Detroit. **John J. Koch,** traffic manager at Pittsburgh, has been appointed assistant to the general traffic manager, succeeding William Hodgdon, deceased. **H. C. Oliver** will replace Mr. Koch as traffic manager and he will in turn be succeeded by **W. R. Cox,** coal traffic manager of the Central region. **S. A. Latimer,** coal freight agent at Pittsburgh has been appointed coal traffic manager, succeeding Mr. Cox. **A. S. Jennings,** district freight agent at Cleveland has been promoted to coal freight agent at Pittsburgh. **F. X. Quinn,** general freight agent in the New York district has been advanced to the newly created position of freight traffic manager at New York. **J. R. Cross,** division freight agent at Buffalo has now been promoted to the position of assistant general freight agent.

Executive

R. S. Marshall, assistant to the president of the Chesapeake & Ohio and the Hocking Valley, with headquarters at Richmond, Va., has been appointed vice-president, with duties as assigned by the president, with the same headquarters. **W. C. Hull,** assistant to the vice-president, with headquarters at Richmond, has been appointed assistant vice-president, reporting to F. M. Whitaker, vice-president in charge of traffic, with the same headquarters. **J. C. Dice** has been appointed assistant to the vice-president, reporting to H. Fitzpatrick, vice-president and general counsel. **C. S. Lake,** special assistant to the president, has been appointed assistant to the president, succeeding R. S. Marshall.

Edwin St. John Greble, Jr., who has been appointed assistant to the president of the Delaware & Hudson, with headquarters at New York, was born on November 9, 1887 at San Francisco, Calif. He graduated from the United States Military Academy at West Point, N. Y., in 1909, and served in the Army until 1915, when he resigned to take charge of the construction of the Lakehurst Proving Ground. He served with the Baldwin Locomotive Works until 1917, when he re-entered the Army. At the end of the World War he again resigned from the Army and re-entered the service of the Baldwin Locomotive Works as manager at Bucharest, Roumania. He returned to the United States in 1925 and was engaged in development and construction work for James O. Heyworth, Inc. He served with Thomas A. Edison, Inc., until June, 1928, at which time he entered the service of the Delaware & Hudson as assistant to the president.

Financial, Legal and Accounting

Effective June 19, **R. P. Eubank,** general real estate agent on the Chesapeake & Ohio and the Hocking Valley at Richmond, Va., will report to and receive instructions from the office of the president.

W. J. Conaty, supervisor of valuation on the Chesapeake & Ohio, at Richmond, Va., has been appointed director of valuation, in charge of valuation matters. He will report to and receive instructions from H. Fitzpatrick, vice-president and general counsel.

Arthur C. Durfee, who has been appointed treasurer of the Buffalo, Rochester & Pittsburgh at Rochester, N. Y., was born on October 7, 1870, at LeRoy, N. Y. He entered the service of the Buffalo, Rochester & Pittsburgh on October 1, 1890, as a clerk in the accounting department. Three years later he was advanced to chief clerk in the coal audit department. On August 1, 1895, he was appointed chief clerk in the treasury department and on March 1, 1910, he became assistant treasurer. Mr. Durfee served as federal treasurer during the United States Railroad Administration and was re-appointed assistant treasurer of the Buffalo, Rochester & Pittsburgh in March, 1920, serving in this capacity until his recent appointment as treasurer, which becomes effective July 1.

Arthur C. Durfee

Operating

Frank L. Foster has been appointed assistant superintendent of freight transportation on the Pittsburgh & Lake Erie, with headquarters at Pittsburgh, Pa.

Harry J. McCall, division roadmaster on the Northern Pacific at Jamestown, N. D., has been appointed trainmaster at Mandan, N. D., succeeding **Thomas B. Quinn,** who retired from active service on May 15. **Henry Flanagan,** trainmaster at Minneapolis, Minn., has been transferred to Forsyth, Mont., succeeding **Caleb Corser,** who has been transferred to Jamestown. Mr. Corser replaces **George N. Slade** who has been transferred to Minneapolis to succeed Mr. Flanagan.

Michael Magiff, superintendent of telegraph and car service on the Central Vermont at St. Albans, Vt., who has retired from the service of that road, was born on March 24, 1852, in New York. He entered the service of the Vermont Central (later the Central Vermont) in January, 1867, serving as operator at various stations until June, 1871, when he was appointed train dispatcher at St. Albans. In January, 1874, he became chief operator and in November, 1875, he was appointed chief dispatcher. From January 1, 1880, to June 15, 1928, he served as superintendent of telegraph. Mr. Magiff also served as superintendent of car service from 1913 to June 15, 1928, in addition to superintendent of telegraph and from 1892 to 1913 as car accountant.

J. D. Dale, division operator on the recently abolished Richmond division of the Pennsylvania has been appointed assistant trainmaster and division operator on the Indianapolis division, with headquarters at Indianapolis, Ind., succeeding **H. C. Kirby,** who has been appointed chief transportation clerk in the office of the general superintendent of the Southwestern division at Indianapolis. **E. A. Burchiel,** trainmaster on the Indianapolis division, has been transferred to the Ft. Wayne division, succeeding **George W. Bradley,** who has been transferred to the Indianapolis division replacing Mr. Burchiel. **J. D. Scott,** trainmaster of the Akron division has been transferred to the Cincinnati division succeeding **C. A. Plotner,** who has been appointed freight trainmaster of the New York division.

J. M. Cameron, general superintendent of the Alberta division of the Canadian Pacific at Calgary for 13 years, has been appointed general manager of the company's lines on Vancouver Island, succeeding H. E. Beasley, who will retire from active railroad service on July 1. Mr. Cameron entered the services of the Canadian Pacific in 1883 as engine wiper. Up until 1907, when he was appointed trainman at Nelson, he occupied positions as pumpman, brakeman, and conductor. In 1910 he became superintendent of the Saskatchewan division and the following year he served in the same capacity at Medicine Hat, which position he held until 1913. He then became assistant general superintendent at Vancouver, where he served for six months. In 1915 he became general superintendent of the Alberta district and he held this position up until the time of his recent appointment as manager of the Canadian Pacific lines on Vancouver Island.

Traffic

Howard H. Ellsworth, agent on the Northern Pacific at Fargo, N. D., has been promoted to assistant general freight agent, with headquarters at St. Paul, Minn., effective July 1.

W. D. Stark, division passenger agent on the Atlantic Coast Line at Jacksonville, Fla., has been appointed assistant general passenger agent, with the same headquarters. **J. G. Kirkland** has been appointed assistant general passenger agent, with headquarters at Tampa, Fla. **B. F. Fuller** has been appointed assistant general passenger agent at New York City, and **H. L. Turner** has been appointed district passenger agent at Augusta, Ga.

D. W. Longstreet, traffic manager of the Illinois Central, with headquarters at Chicago, has been elected vice-president in charge of the traffic department, with headquarters at the same point, effective July 1. Mr. Longstreet succeeds **F. B. Bowes,** who will sever his active connection with the Illinois Central by voluntary retirement on July 1, after 52 years of continuous service in the traffic department. **C. C. Cameron,** assistant freight traffic manager, with headquarters at Chicago, has been promoted to freight traffic manager, succeeding in part to Mr. Longstreet's duties.

R. E. Buchanan, who has been promoted to assistant traffic manager of the Pensacola division of the St. Louis-San Francisco with headquarters at Pensacola, Fla., has been in the service of that railroad for nearly 31 years. He was born at Okolona, Miss., and entered the service of the Frisco in July, 1897, at Memphis, Tenn., as a telegraph messenger. Shortly after that time he became a yard clerk at Memphis and he

R. E. Buchanan

was then advanced successively through minor positions in the local freight office to chief bill clerk. He was then appointed first clerk to the contracting freight agent and until 1922 he served successively as soliciting freight agent, traveling freight agent, division freight agent and southern export agent during federal control of the railroads. Mr. Buchanan was promoted to executive general agent with headquarters at Memphis in 1922, a position he held until his further promotion to assistant traffic manager on May 15.

John E. Anderson, who has been promoted to general freight agent of the Cleveland, Cincinnati, Chicago & St. Louis, with headquarters at Cincinnati, Ohio, has been in the service of the traffic department of that railroad for 23 years. He was born at Lawrence, Kan., on October 15, 1887, and attended the Lawrence Business College and the St. Louis (Mo.) College of Law. Mr. Anderson entered the service of the Big Four as a clerk at Kansas City, Mo., on May 18, 1905, and for the next 20 years served successively in that position, as rate clerk and city freight agent at St. Louis, as traveling freight agent and as chief clerk in the traffic department at Chicago, as commercial agent at Detroit, Mich., as general agent and as division freight agent at Cincinnati, and as division freight agent at Cleveland, Ohio. In 1925 he was promoted to assistant general freight agent at Cleve-

John E. Anderson

land, his promotion to general freight agent at Cincinnati becoming effective on June 1.

Frank A. Curry, who has been promoted to assistant freight traffic manager of the New York, Chicago & St. Louis, with headquarters at Chicago, first entered railway service as a telegraph operator on the Boston & Maine. Later he served consecutively as station agent and then freight agent for the New York Central at Yonkers, N. Y., and freight agent on the same railroad at Sixtieth street, New York. Mr. Curry entered the service of the Lake Erie & Western (now part of the Nickel Plate) as division freight agent at Indianapolis, Ind., in 1911 where he remained until 1916 when he was promoted to assistant general freight agent, with headquarters at the same point. His promotion to assistant freight traffic manager with jurisdiction over Central and Northwestern territory became effective on June 1.

William B. Ferguson who has been promoted to general freight agent of the Cleveland, Cincinnati, Chicago & St. Louis, with headquarters at Cincinnati, Ohio, was born on March 9, 1878,

at Cincinnati. He entered railway service on June 24, 1896, as an office boy on the Baltimore & Ohio Southwestern (now part of the Baltimore & Ohio) at Cincinnati. He was advanced successively through the positions of stenographer, tracing clerk, coal clerk, rate clerk, chief clerk to the commercial agent and chief clerk to the division freight agent, all at Cincinnati, and on May 1, 1904, he became chief clerk to the district freight agent of the Illinois Central at Cincinnati. On March 1, 1906, Mr. Ferguson left railroad service to become superintendent of county buildings of Hamilton county, Ohio, returning on August 6, 1907, as executive clerk on the Southern at Cincinnati. He entered the service of the Big Four on December 16, 1909, as chief clerk to the chief of the tariff bureau at Cincinnati,

William B. Ferguson

then being advanced successively to chief clerk to the traffic manager and to chief of the tariff bureau. On March 1, 1920, he was promoted to assistant general freight agent, with headquarters at Cincinnati. Mr. Ferguson's promotion to general freight agent became effective on June 1.

Engineering, Maintenance of Way and Signaling

William G. Ashworth, roadmaster on the Northern Pacific at Jamestown, N. D., has been promoted to division roadmaster at the same point, succeeding **Harry J. McCall,** who has been transferred to the operating department.

F. S. Hales, who has been promoted to engineer of the Cleveland Terminal Improvements of the New York, Chicago, & St. Louis with headquarters at Cleveland, Ohio, has been in the engineering department of that railroad for 12 years. He was born at Wilson, N. C., on April 13, 1893, and graduated from a course in civil engineering at North Carolina State College in 1913, obtaining a professional degree from Cornell University in 1916. Mr. Hales entered railway service in June, 1916, as a draftsman in the grade elimination department of the Nickel Plate. From June, 1918, to December, 1918, he served as a second lieutenant in the field artillery of the United States Army and then returned to the Nickel Plate as a draftsman on grade crossing elimination. In October, 1919, Mr. Hales was promoted to assistant engineer with the corporate chief engineer on work connected with the settlement for the period of federal control. During the period from April 1920, to August, 1924, he was for four years assistant engineer in the bridge department and for four months assistant engineer in the maintenance of way department. Mr. Hales was then promoted to engineer of track of the Nickel Plate district; in May, 1925, his jurisdiction was extended to include the Lake Erie & Western district and in January, 1927, his jurisdiction was again extended to cover the entire system. On June 1, he was promoted to engineer of the Cleveland Terminal Improvements, in charge of the construction of the Nickel Plate portion of the work in connection with the new Union station, including grade crossing elimination and new freight and yard facilities.

Mechanical

J. T. St. Clair, engineer of car construction of the Atchison, Topeka & Santa Fe, with headquarters at Chicago, resigned on June 15 to become vice-president and general manager of mining properties in Halifax, N. S., in which he is interested.

J. A. Sheedy, master mechanic on the Eastern division, with headquarters at Canton, O., has been transferred to Wilmington, Del. **C. A. Plotner,** trainmaster on the Cincinnati division has been appointed freight trainmaster on the New York division, succeeding C. F. Lingenfelter, promoted.

D. K. Chase, master mechanic of the Buffalo division of the Pennsylvania, with headquarters at Olean, N. Y., has been transferred to the Eastern division, with headquarters at Canton, Ohio, succeeding **J. A. Sheedy,** who has been transferred to the Eastern region. **H. L. Nancarrow,** assistant master mechanic of the Akron division, with headquarters at Akron, Ohio, has been promoted to master mechanic of the Erie & Ashtabula division, with headquarters at Mahoningtown, Pa., succeeding **H. S. Noble,** who has been transferred to the Cleveland division, with headquarters at Wellsville, Ohio. Mr. Noble replaces **E. L. Bachman,** who has been transferred to the Buffalo division to succeed Mr. Chase. **H. D. Carpenter,** enginehouse foreman at Zanesville, Ohio, has been promoted to assistant master mechanic of the Akron division succeeding Mr. Nancarrow.

Special

R. E. Kelly, who has been appointed manager of development and colonization of the Southern Pacific, with headquarters at San Francisco, Cal., has been in the service of that railroad and its associated companies for 27 years. He was born on March 19, 1880, at Huntington, W. Va., and attended school at Paducah, Ky., and the University of Washington. Mr. Kelly entered railway service in 1900 when he became a switchman in the Tacoma (Wash.) yards of the Northern Pacific. Later in the same year he became a brakeman on the Seattle-International, (now part

R. E. Kelly

of the Northern Pacific), entering the service of the Southern Pacific in 1901 as a conductor. Since that time Mr. Kelly has served successively as a dispatcher, ticket and express agent, city ticket agent, traveling traffic inspector, general agent in the freight and passenger departments at San Bernardino, Cal., general agent in the passenger department at Los Angeles, Cal., representative of the executive department in charge of public relations at San Francisco and as manager of development, with headquarters at the same point. He was promoted to manager of development and colonization on June 1.

Purchases and Stores

C. H. Dayton, has been appointed division storekeeper on the Michigan Central at West Detroit, Mich., succeeding **F. V. Tenkonohy,** resigned.

Obituary

Frank E. Andrews, commerce attorney of the Atchison, Topeka & Santa Fe, with headquarters at Chicago, died in that city on June 21.

Hezekiah Bissell, formerly head of the engineering department of the Boston & Maine, died on June 24 at Pasadena, Calif. Mr. Bissell was one of the engineers who surveyed and built the Union Pacific, he also built the Adirondack and the Puno & Cuzco in Peru. He entered the service of the Eastern

in 1887 and later, when this road was absorbed by the Boston & Maine, served as chief engineer of the system, from which position he retired in 1909.

K. M. Wharry, who was general freight agent of the Missouri Pacific, with headquarters at Kansas City, Mo., from 1908 to 1913, died at Chicago on June 16. From 1905 to 1908 Mr. Wharry was assistant general freight agent of the Chicago, Rock Island & Pacific at Kansas City. At the time of his death he was commerce agent for the Illinois Freight Audit Company at Chicago.

Joseph K. Choate, president of the Morris County Traction Company and formerly division superintendent of the Colorado division of the Union Pacific, died on June 19 in San Francisco, at the age of 74. Mr. Choate first entered the railroad field in June, 1881, as supervisor on the Pennsylvania, leaving this post in the following month to become assistant engineer of the New York, Lake Erie & Western. During 1883 and 1884, Mr. Choate served in a similar capacity on the Erie & Wyoming Valley (now a part of the Erie) and in November, 1884, received a special assignment on the Union Pacific. In December of the same year he became superintendent of the Nevada Central, remaining with this road until February, 1885. The following month he became assistant superintendent on the Colorado division, Union Pacific, and in 1885, was appointed superintendent of this same division, which position he held until he resigned from railroad work in May, 1890.

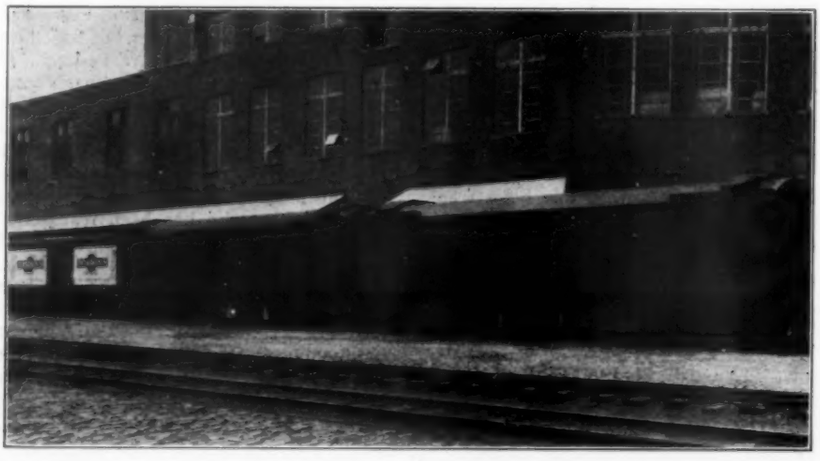
Claude George Burnham, executive vice-president of the Chicago, Burlington & Quincy, the Colorado & Southern and the Fort Worth & Denver City, with headquarters at Chicago, died at his home at Kenilworth, Ill., on June 22 at the age of 47 years. Pneumonia, following an attack of heart disease which had confined him to his home for the past five months, was the cause of his death. Mr. Burnham was born at Peterboro, England, on June 20, 1881, and was educated in the public schools at St. Paul, Minn. He entered railway service in 1895 as an office boy in the general freight department of the Great Northern at St. Paul, then serving in various minor positions with that railroad until February, 1902, when he was appointed chief clerk to the foreign traffic agent of the Burlington. In April, 1904, Mr. Burnham was promoted to foreign traffic agent, with headquarters at Chicago, and two years later he was again promoted to assistant to the first vice-president in charge of traffic. He was elected vice-president in charge of traffic of the Burlington and the Colorado & Southern in January, 1910, being elected executive vice-president of those two railroads in October, 1917. From June, 1918, to November, 1919, he served as federal manager of the Burlington and the Quincy, Omaha & Kansas City, resuming his former position as executive vice-president of the Burlington and the C. & S., at the end of the period of federal control of the railroads, with the Fort Worth & Denver City added to his jurisdiction.

Claude George Burnham

G. A. Montgomery, vice-president and general manager of the Algoma Central & Hudson Bay and president of the Algoma Eastern, died at Sault Ste. Marie, Ont., on June 27, following an operation.

John Bennington Berry, formerly chief engineer of the Union Pacific and the Chicago, Rock Island & Pacific, died at his summer home at Three Lakes, Wis., on June 22 at the age of 76 years. Mr. Berry was born on December 14, 1851, at Paterson, N. J., and received his education by private tutor and in the Brooklyn Polytechnic Institute. He entered railway service in 1874 as an assistant engineer on construction on the Chicago & North Western, being later advanced through various positions in the engineering department to division engineer of the Wisconsin and later of the Galena division. In 1893 Mr. Berry was promoted to chief engineer of what were then known as the Trans-Missouri lines of the North Western, the Fremont, Elkhorn & Missouri Valley and the Sioux City & Pacific, with headquarters at Omaha, Neb. He was appointed chief engineer of the Union Pacific, with headquarters at Omaha, in 1898. During his period of service with that railroad, until 1905, Mr. Berry was directly responsible to E. H. Harriman, chairman of the board of directors of the Union Pacific, for the extensive reconstruction program. In 1904 he prepared a monograph on the "Reduction of Gradient, and Elimination of Distance, Curvature, and Rise and Fall on the Union Pacific" which was published by the American Railway Engineering Association and is still considered as an authority on the economics of grade reduction. Mr. Berry resigned from the Union Pacific on November 10, 1905, to become chief engineer of the Rock Island, with headquarters at Chicago, a position he held until his appointment as assistant to the president, with headquarters in the same city, in March, 1913. During 1911 and 1912 he was also supervising engineer of the St. Louis-San Francisco. In 1914 he left the Rock Island to enter consulting engineering practice as a member of the firm of Berry, Howard & Roberts at Chicago. At various times after entering consulting practice Mr. Berry served as consulting engineer for the Grand Trunk Western and the St. Louis Southwestern. Since 1922 Mr. Berry had made his home in Omaha. He was a charter member of the A. R. E. A. and served as a member of the board of direction from 1907 to 1909 and as chairman of the Roadway committee in 1900. In 1905 he was appointed a member of the board of consutling engineers of the Isthmian Canal Commission.

* * * *



Milk Express Cars Ready for Loading at New Borden Plant on the D. L. & W. at Newark, N. J.

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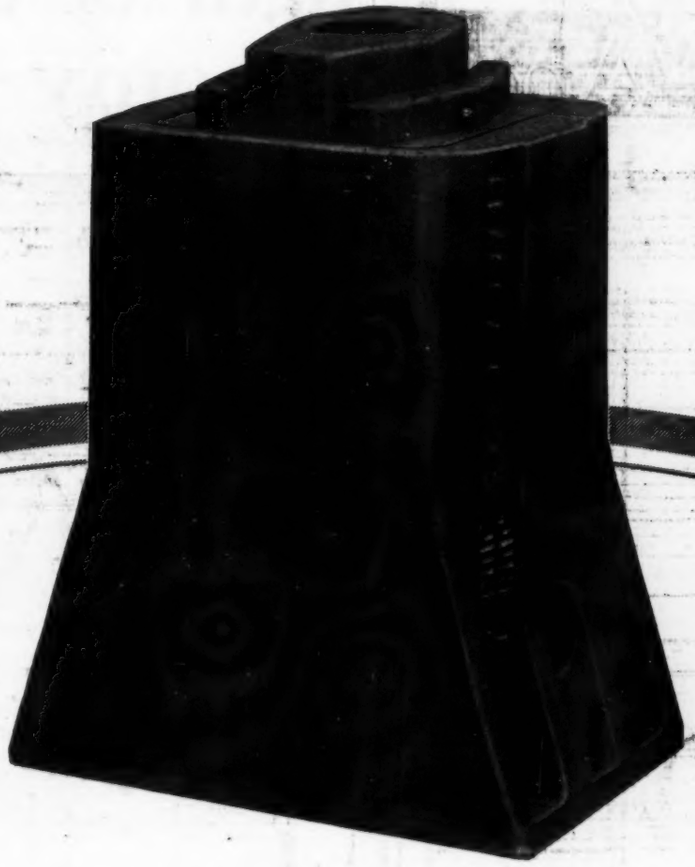

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A PERMANENT SOLUTION OF THE DRAFT GEAR PROBLEM FOR ALL CARS ORIGINALLY BUILT WITH THE 18½ INCH LUG SPACING.

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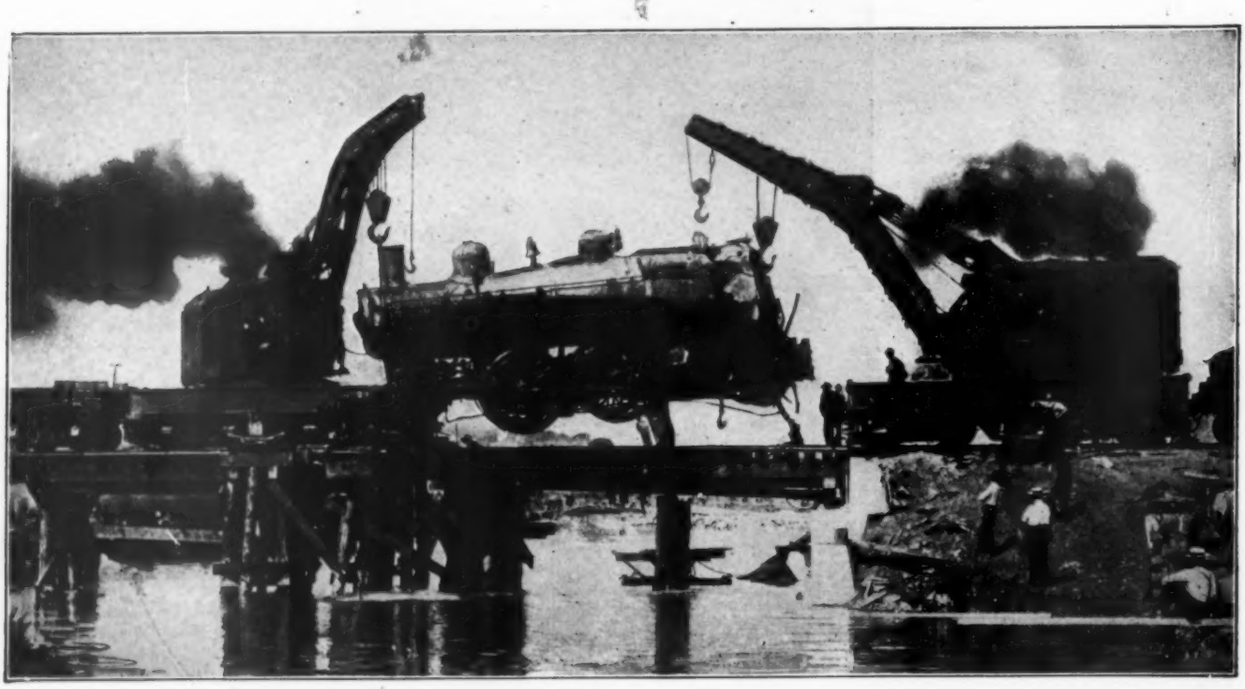
Industrial Brownhoist Cranes Set the Standard ~ ~ ~ ~ ~ ~ ~ For Speed, Length of Service ~ ~ ~ And Economy ~ ~ ~



Industrial and Brownhoist were the originators of the locomotive crane industry in this country. Today there are thousands of these cranes in use—far more than any other make. ¶The advantages of mere numbers are unimportant, but the knowledge gained from long experience can be obtained in no other way. ¶Today Industrial Brownhoist offers you by far the most complete line of similar equipment ever manufactured by one company; locomotive cranes ranging from 7½ to 60 tons, wrecking cranes from 75 to 200 tons, and shovels of ½ to 1¼ yards capacity. ¶Getting the right crane or shovel, the one best size and type for your work, is your best guarantee of satisfactory, economical handling. And Industrial Brownhoist is best qualified to furnish this for you.

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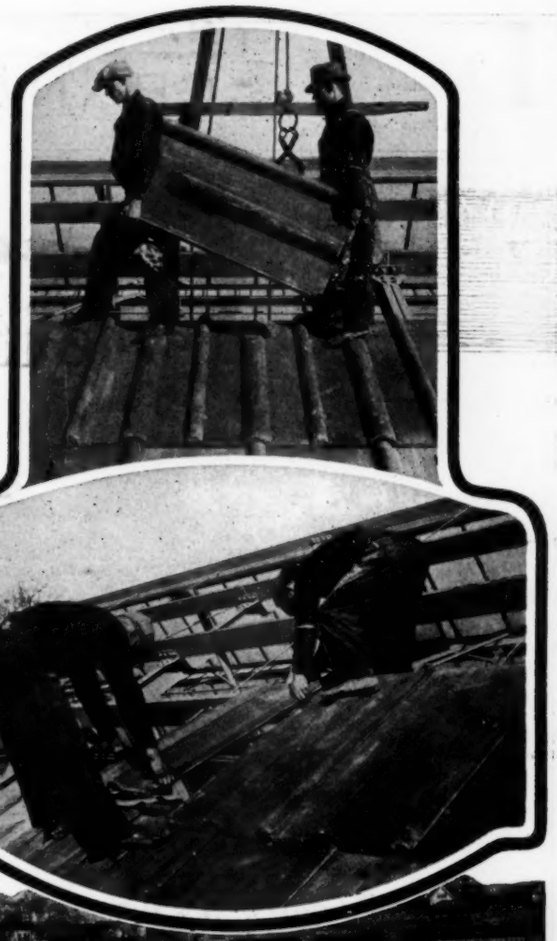

CEMENTILE Roofs are the easiest of all roofs to lay. The tile is simply "laid" in place, directly on the purlins—no sheathing to prepare. Speed is the natural result . . . saving time and cutting down the total roofing cost materially.

With these important economic advantages goes a protection that is unrivalled in degree and length. *Cementile* is proof against the hazards of fire, lightning, wind, snow, sleet, rain and sun, for the average life of a building—with practically no maintenance cost throughout its many years of service.

There are three types of Cementile [1] Red Interlocking; [2] Flat; [3] Channel—also glass lighted Cementile for Skylighting. For engineering data write for the Cementile Catalog.

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Simply Lay the Tile in Place

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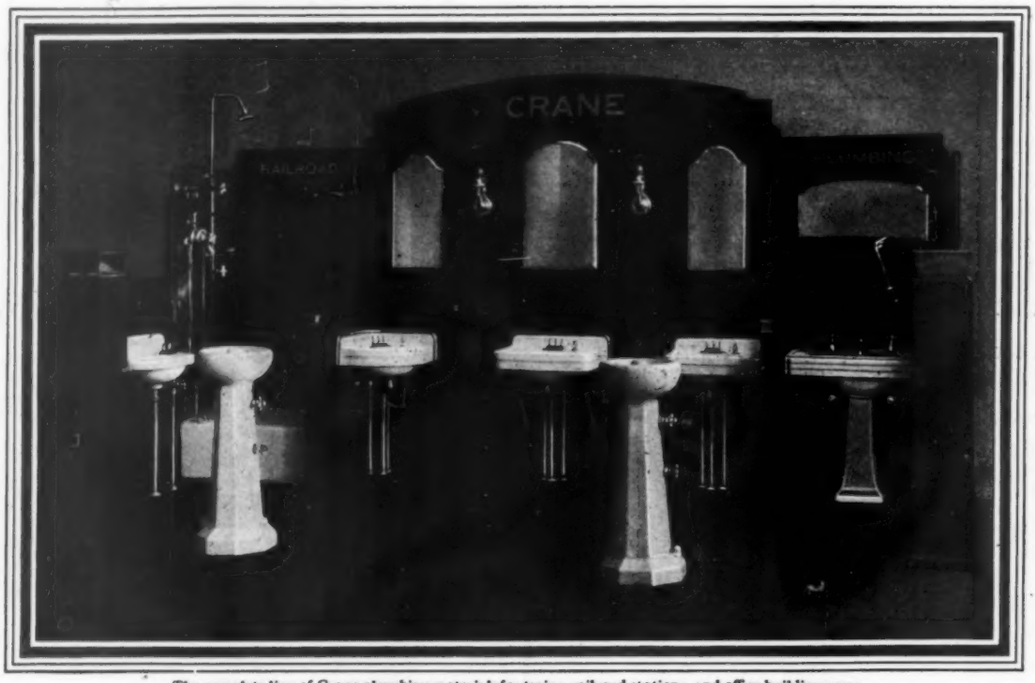

The complete line of Crane plumbing materials for trains, railroad stations, and office buildings was visualized in the Crane booth at the American Ass'n of Railroad Supt. Convention at Memphis.

Now! Crane plumbing for trains

The traveling public is admiringly familiar with Crane plumbing, because they find it in leading hotels and prefer it for their homes. Railroad officials too know the beauty, comfort, and sanitation of Crane fixtures, and the quality of Crane plumbing valves and fittings; because they have chosen these materials for many newer railroad stations and office buildings.

Now, Crane fixtures in glistening easily cleaned twice-fired vitreous china and porcelain enameled iron are offered for sleepers, club cars, dining cars, coaches and all places aboard train. These fixtures have been compactly designed for their special purposes. Chromium plating on faucets and exposed metal parts keeps its untarnished beauty. Every detail has been planned for convenience and service.

The addition of these fixtures for trains to the Crane line enables Crane Co. to supply plumbing materials for every railroad need, in rolling or stationary property. Write for full information.

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One of Union Pacific's White six-cylinder Busses about to leave the depot at Cedar City for a tour of Southern Utah parks

Union Pacific Uses White Busses

IN making more accessible to the public the geological wonders of Southern Utah and Northern Arizona as found in Zion Canyon National Park, Bryce Canyon, Cedar Breaks, Kaibab National Forest and the Grand Canyon National Park, the Union Pacific System is using satisfactorily a fleet of four and six-cylinder White Busses.

With its chain of modern hotels and excellent transportation system the Union Pacific has made it possible for the tourist to visit the fairy-lands of Utah with extreme ease and comfort. From Cedar City, the southern terminus of the Union Pacific System, and the gateway to Utah's national parks, the railroad uses a fleet of motor busses to carry tourists from the point where rails end to a land of flaming canyons, unsurpassed for scenic beauty.

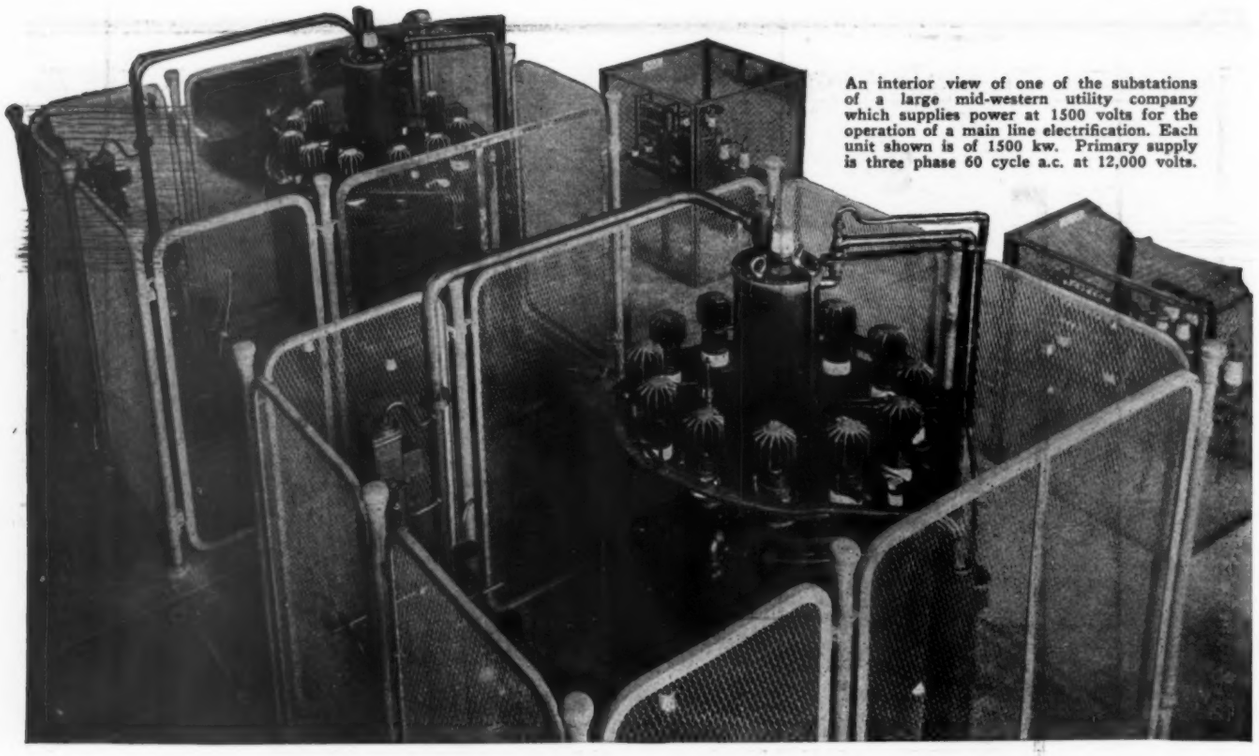
During the winter season the Union Pacific uses White six-cylinder busses in handling passenger transportation on its branch line between Cedar City and Lund. The performance of its White equipment, according to officials of the Union Pacific, is entirely satisfactory.

In addition to the Union Pacific, White Busses are serving dependably and economically a score or more of the country's leading railroads.

THE WHITE COMPANY, *Cleveland*

WHITE BUSSES

FOURS AND SIXES



An interior view of one of the substations of a large mid-western utility company which supplies power at 1500 volts for the operation of a main line electrification. Each unit shown is of 1500 kw. Primary supply is three phase 60 cycle a.c. at 12,000 volts.

Higher voltages — higher efficiencies

VOLTAGES, customarily used in electric railway practice are high enough to show substantial efficiency gains where A-B-B rectifiers handle the conversion function. Beginning at about 4% saving over best rotary converter performance for all-day runs at 550 volts, they reach much higher gains in similar comparisons on properties operating at 1500 volts such as the one illustrated here. The exact percentage gained depends necessarily on the load characteristics of the system under consideration.

We shall be glad, upon receipt of inquiries, to supply typical load curve comparisons. Further advantages of A-B-B rectifiers are given below:—

Simple operation and minimum attention.
No synchronizing.
Very high momentary overload capacity and insensibility to short circuits.
Negligible maintenance.
Low weight. No special foundations.
Noiseless and vibrationless operation, consequently rectifier substations can be erected in densely populated localities.
New substations need only be of light construction. The plant can often be erected in places that could not be considered for rotating machinery.

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Camden New Jersey

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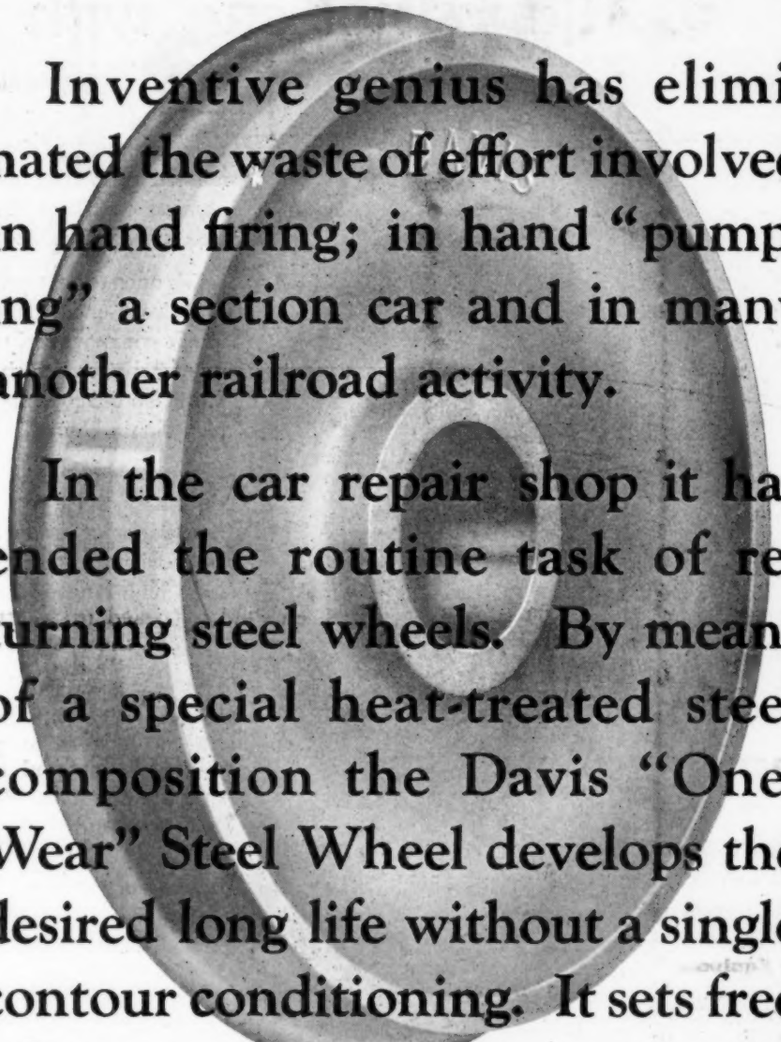
AMERICAN BROWN BOVERI

Set Free from a Troublesome Task



Inventive genius has eliminated the waste of effort involved in hand firing; in hand "pumping" a section car and in many another railroad activity.

In the car repair shop it has ended the routine task of returning steel wheels. By means of a special heat-treated steel composition the Davis "One-Wear" Steel Wheel develops the desired long life without a single contour conditioning. It sets free labor, material and money for other productive work.

AMERICAN STEEL FOUNDRIES

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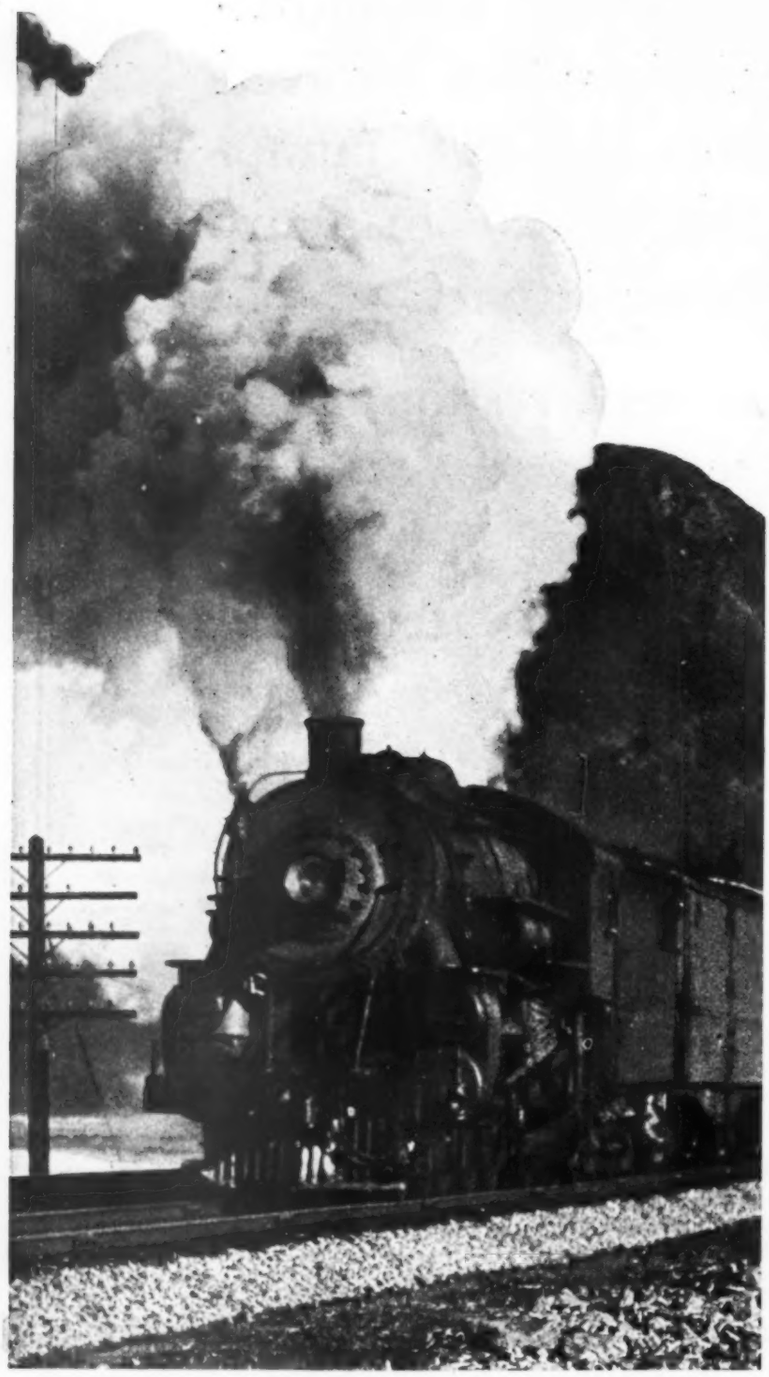
Johns-Manville Service to Railroads

. . does not end with the sale



FOR many years Johns-Manville has contributed to the maintenance of railroad properties, and to the economical operation of trains, through Asbestos and its allied products.

We operate our own Asbestos Mines in Arizona and Quebec. This assures us of a constant supply of the best quality of Asbestos, which is worked into finished products at nine manufacturing plants in the United States and Canada.

Among the Johns-Manville items of chief importance to railroads are pipe insulations of every type, passenger and refrigerator car insulations, smoke jacks and Built-up Asbestos roofing, besides special roofs to meet peculiar demands for service. Johns-Manville refractory cements lengthen the life of fire-box linings in stationary boilers and locomotives, while packings, steam traps and other power plant materials conserve power and cut costs in pumping plants and power houses. In fact power whether supplied by electrical stations or by great locomotives, is produced at lower cost through Johns-Manville Service to Railroads.

Johns-Manville Service to Railroads does not end with the sale. We have a staff of engineers and experts who are constantly ready to be of any possible assistance to Railway officials.

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MASTER ASBESTOS
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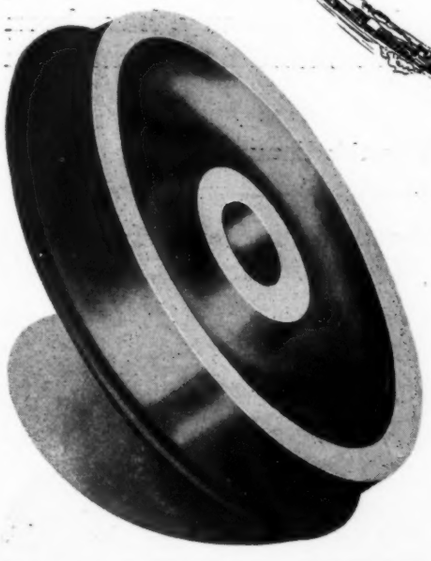
RAILROAD DEPARTMENT

Safe *all the way---*



BETHLEHEM Rolled Steel Wheels are safe all the way, mile upon mile, throughout their long years of service. These wheels are made by a combined forging and rolling process. The forging imparts toughness and density, and the rolling establishes a grain structure in the metal which is complete assurance against breakage and crystallization.

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BETHLEHEM

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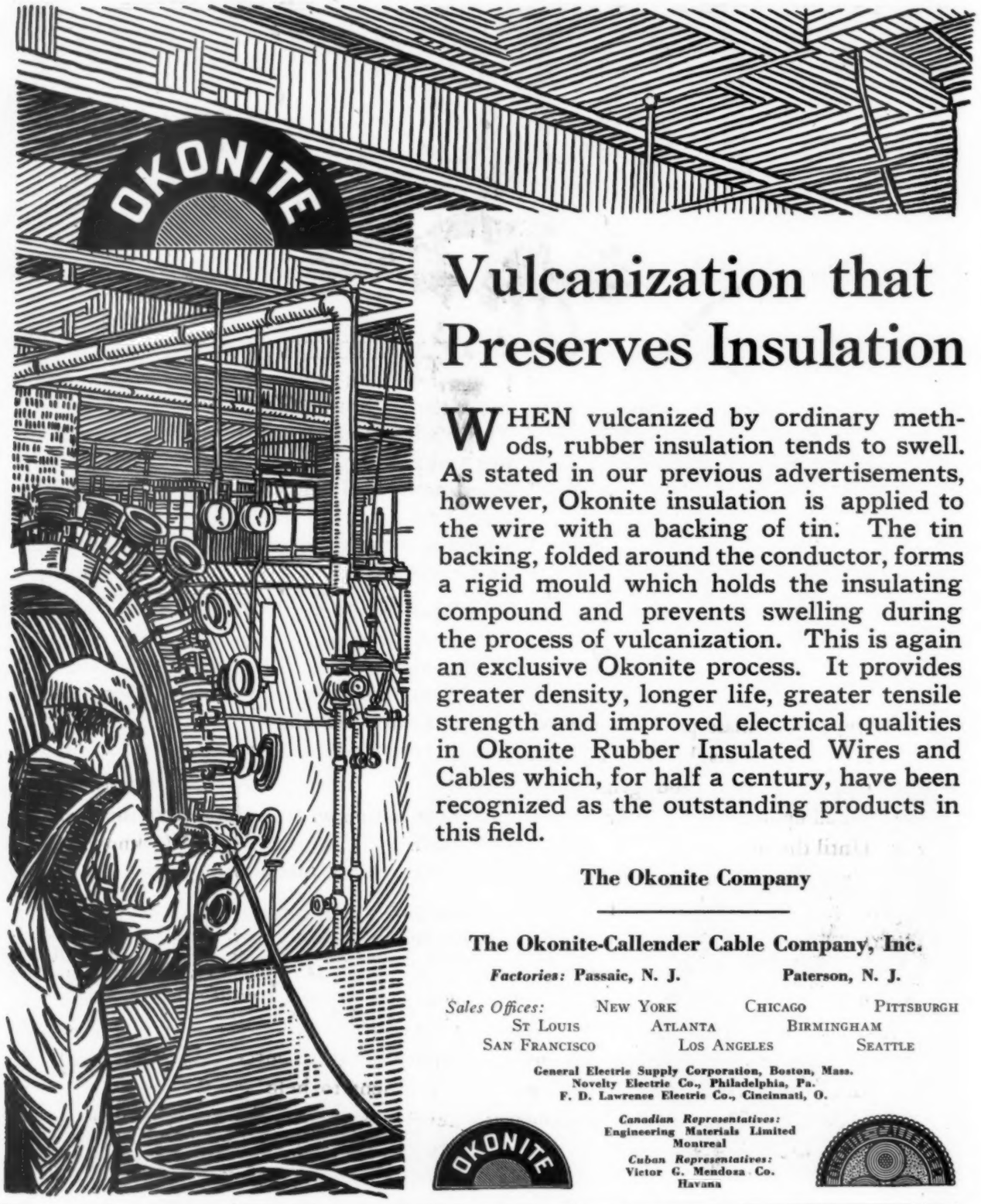

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WHEN vulcanized by ordinary methods, rubber insulation tends to swell. As stated in our previous advertisements, however, Okonite insulation is applied to the wire with a backing of tin. The tin backing, folded around the conductor, forms a rigid mould which holds the insulating compound and prevents swelling during the process of vulcanization. This is again an exclusive Okonite process. It provides greater density, longer life, greater tensile strength and improved electrical qualities in Okonite Rubber Insulated Wires and Cables which, for half a century, have been recognized as the outstanding products in this field.

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OKONITE

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In the early days of American industry, before mass production was the rule, certain machines such as lathes, planers, millers, and grinders were called upon for many kinds of work. Until the present gigantic production plans were evolved, these machines functioned economically on their many tasks.

Today, however, the special purpose machine is becoming of vital importance. Where a certain operation must be performed countless times a day, a special purpose machine may be designed that cuts ordinary costs to a fraction.

It has been the privilege of Niles-Bement-Pond and its Divisions to work with some of the greatest manufacturers in the country in developing and building many of these special purpose machines. We know from our experience that many other Companies in the metal working industry, could secure almost unbelievable benefits by opening their eyes to the possibility of special purpose machines. We would gladly lend all our resources of men and equipment to help any Company to develop special machine tools that promise to be of mutual benefit.

Niles-Bement-Pond Company, 111 Broadway, New York

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Two vital qualities give metal paint its protective value . . . One paint has repeatedly proved its ability to retain them for an unusually long time

IN any metal paint, continuity and adherence of the paint film are the factors that determine protective value. Paint that does not *hold* its continuity admits the agents of corrosion. If it does not *retain* adherence, it scales off and leaves the metal unprotected.

Red-lead has proved its ability to retain these vital qualities many years. It saves thousands of dollars yearly in depreciation and repainting costs.

The tough, durable red-lead paint film stays elastic . . . expands and contracts with the metal under every change in temperature. No breaks or cracks develop . . . red-lead *holds* its continuity.

And its contact with the metal is so perfect that it clings tenaciously throughout a remarkably long life. Scaling and peeling do not occur; the paint film *remains* adherent.

Thus it is that pure red-lead is accepted as the standard paint for metal. Thus it is that three coats of pure red-lead paint form a protective coating for metal that is unexcelled.

Paste and Liquid Red-Lead

Fine, uniform, highly oxidized—there is no better red-lead obtainable than Dutch Boy red-lead. It comes in two forms—paste and liquid. The liquid (ready for the brush) is supplied in six different colors—the natural orange-red, two shades each of green and brown, and black. The paste comes in the orange-red and can be shaded to dark colors.

Free paint service

Whenever you encounter an unusual painting problem, you will find our special technical staff ready to serve you. Their wide experience and exhaustive knowledge of painting enable them to give valuable assistance. Address the Department of Technical Paint Service, in care of our nearest branch office.

CONTINUITY FAILED

Tiny breaks developed in this paint film . . . rust-forming agents entered . . . spot-rust started its destructive work. The paint did not retain its continuity.

ADHERENCE WEAKENED

This paint film has lost its contact with the metal. It scaled off in patches . . . left the metal unprotected. The paint did not retain its adherence.

NATIONAL LEAD COMPANY

New York, 111 Broadway . Boston, 800 Albany Street . Buffalo, 116 Oak Street Chicago, 900 West 18th Street . Cincinnati, 659 Freeman Avenue . Cleveland, 820 West Superior Avenue . St. Louis, 722 Chestnut Street . San Francisco, 235 Montgomery Street . Pittsburgh, National Lead & Oil Co. of Pa., 316 Fourth Avenue . Philadelphia, John T. Lewis & Bros. Co., 437 Chestnut Street.

DUTCH BOY RED-LEAD

NOTES ON USES OF NICKEL CAST IRON

PRODUCT: Compressor Stuffing Box.

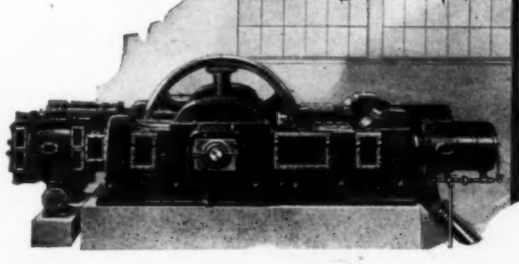
COMPANY: Urick Foundry Co., Erie, Pa.

PROBLEM: To insure grain refinement and freedom from internal shrinkage in a product that must be readily machinable.

SOLUTION: A Nickel Cast Iron of the following analysis gave the desired results:

Total Carbon	3.25%
Silicon	1.25
Nickel	1.00

The Nickel Cast Iron stuffing box, illustrated above, was produced by the URICK FOUNDRY for use in the Bessemer Air and Gas Compressor shown below.



REMARKS:

The Urick Foundry Co. reports that the above Nickel Iron Mixture has helped reduce rejections of stuffing box castings approximately 80%.

This improvement in casting quality is largely due to the more uniform density secured through the addition of Nickel. As a result of this greater uniformity, there is no longer any possibility of internal shrinkage coming to light after time and expense have been expended on machining operations.

The refined grain of the Nickel-bearing product insures clean-cut finishing, and the higher and more uniform hardness of the material provides better wearing properties.

The superior properties of the Nickel Cast Iron have made it possible to meet consistently the 300 lb. pressure operating requirement to which this stuffing box is subjected.

Our foundry specialists will gladly discuss your casting problems with you.

INCO NICKEL TRADE MARK

Nickel

THE INTERNATIONAL NICKEL COMPANY (INC.) 67 WALL STREET, NEW YORK, N. Y.

The Milk Train
carrier of good health

2,750,000 quarts of milk, New York City's daily supply, is brought in every night by the railroads from an average distance of 200 miles. Much of it travels 500 miles. Yet New York is reputed to have a purer milk supply than any other city in the world.

Recently a milk tank-car, carrying 12,000 quarts of fresh milk in two large glass-lined tanks, ran from Wisconsin to Florida, a distance of 1,800 miles, in 101 hours. With a change of temperature of 68 degrees outside, the temperature of the milk rose only one degree.

Such efficiency by the railroads in the transportation of food supplies has contributed greatly to the nation's health.

By supplying the oxwelding needs of railroads controlling a majority of the trackage in the country, the Oxweld Railroad Service Company has had a part in the development of modern railroading. Fifteen years of service has proved the value of an Oxweld Railroad Service contract.

OXWELD RAILROAD SERVICE

THE OXWELD RAILROAD SERVICE COMPANY
Unit of Union Carbide and Carbon Corporation
UCC
New York City: Carbide and Carbon Building
Chicago: Railway Exchange

"In Use Since 1844"

WHEREVER you find this label on staybolt iron in railroad shops, you find satisfaction.

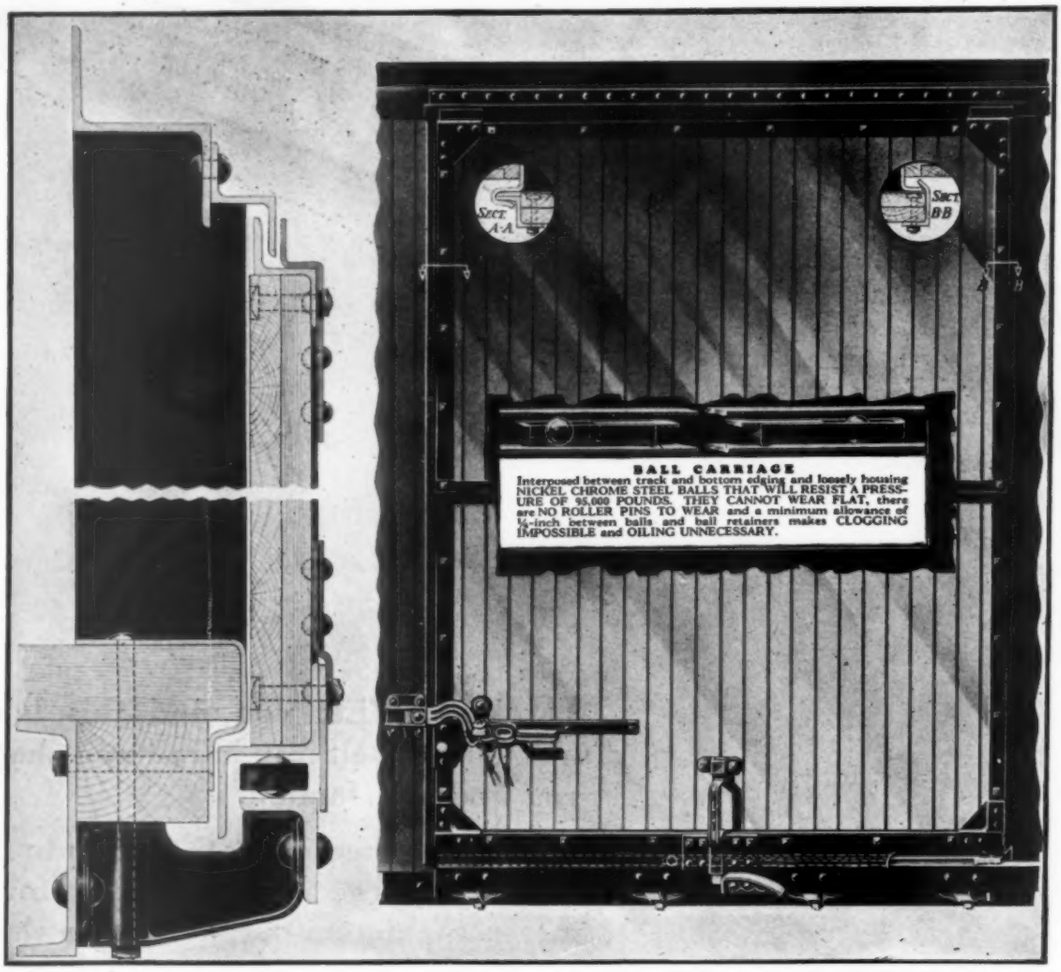
It means immediate satisfaction to the men who forge it and work it, for it means maximum output in the shop.

It also means ultimate satisfaction to the men who can report fewer failures and substantial decreases in their operating and maintenance costs.

There is no substitute for the best wrought iron. It is economical, dependable—and safe.

EWALD IRON COMPANY
LOUISVILLE
CHICAGO NEW YORK ST. PAUL

THE BALL BEARING CAR DOOR


SECT. A-A
SECT. B-B
BALL CARRIAGE
Interposed between track and bottom edging and loosely housing NICKEL CHROME STEEL BALLS THAT WILL RESIST A PRESSURE OF 96,000 POUNDS. THEY CANNOT WEAR FLAT, there are NO ROLLER PINS TO WEAR and a minimum allowance of ½-inch between balls and ball retainers makes CLOGGING IMPOSSIBLE and OILING UNNECESSARY.

It Eliminates

FRICTION	PILFERING
DAMAGED GUIDES	BROKEN HANGERS
FLATTENED ROLLERS	WEAR OF ROLLER PINS
NECESSITY OF OILING	"BUTTING" IN TRANSIT

SNOW AND ICE FROM THE TRACK

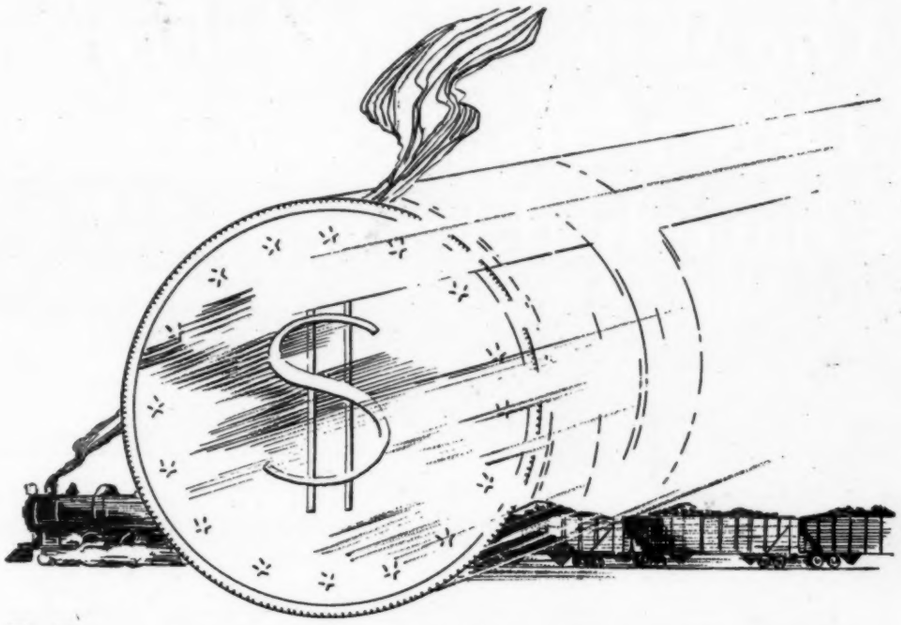
UNSATISFACTORY OPERATION DUE TO INACCURATE MACHINING

UNSATISFACTORY OPERATION DUE TO CORROSION

MANUFACTURED and SOLD
IN BOTH TOP HUNG AND BOTTOM SUPPORTED TYPES BY THE

CHICAGO RAILWAY EQUIPMENT COMPANY

CHICAGO, ILLINOIS



Your Operating Dollar Goes Farther

The railroad that is trying to get the greatest value for its operating dollar considers unit cost, rather than first cost, in the purchase of its material. As applied to the purchase of wheels, unit cost means *cost-per-mile.*

Carnegie Light Weight Wrought Steel Wheels, for freight cars with a maximum journal of 5½" x 10", cost less per mile than any other type of wheel available for this class of service. Not only that, but they also insure safety and durability comparative to that given by our heavier wheels in passenger service—where wrought steel wheels have long been accepted as the standard of excellence.

It is this extra value, the safety feature, that has been responsible for the popular reception accorded these new wheels. Your operating dollar purchases not only the most miles, but the maximum of safety as well. Inasmuch as these wheels require no reconditioning, there is no maintenance cost.

Our wheel engineers will gladly cooperate with you.

CARNEGIE STEEL COMPANY

General Offices—Carnegie Building

PITTSBURGH, PENNA.

1897

. . . The *Wheel Safety, Economy,* and *Dependability* that Passenger Cars have had for years

now made available in a light-weight wheel especially suited to *freight car service.*

Our wheel engineers will be pleased to give you detailed information on the new Gary Light-Weight Wrought Steel Wheel.

Illinois Steel Company

General Offices: 208 South La Salle Street
Chicago, Illinois

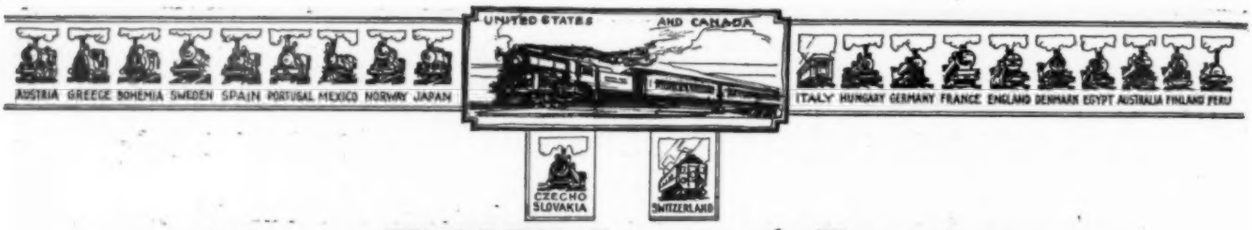
All transportation companies now recognize that theirs is a *selling* as well as an operating job. And they have found that wheels, forgings and other parts of "Standard" Steel not only help to keep down operating costs but increase the comfort and the safety of equipment to a point which strengthens public confidence and makes it easier to sell a transportation service.

STANDARD STEEL WORKS COMPANY
PHILADELPHIA, PA.

BRANCH OFFICES

CHICAGO NEW YORK PORTLAND SAN FRANCISCO PITTSBURGH
ST. LOUIS HOUSTON RICHMOND ST. PAUL MEXICO CITY

WORKS: BURNHAM, PA.


AUSTRIA GREECE BOHEMIA SWEDEN SPAIN PORTUGAL MEXICO NORWAY JAPAN
UNITED STATES AND CANADA
ITALY HUNGARY GERMANY FRANCE ENGLAND DENMARK EGYPT AUSTRALIA FINLAND PERU
CZECHO SLOVAKIA
SWITZERLAND

More SKF Journal Bearings Are In Use In This Country And Abroad Than All Other Anti-Friction Bearings Combined

ONLY thoroughly proven equipment should bear the responsibility of railroad work and SKF has proven itself under all kinds of conditions of railroad service.

SKF Journal Bearings alone have the years of successful service behind them to establish their dependability.

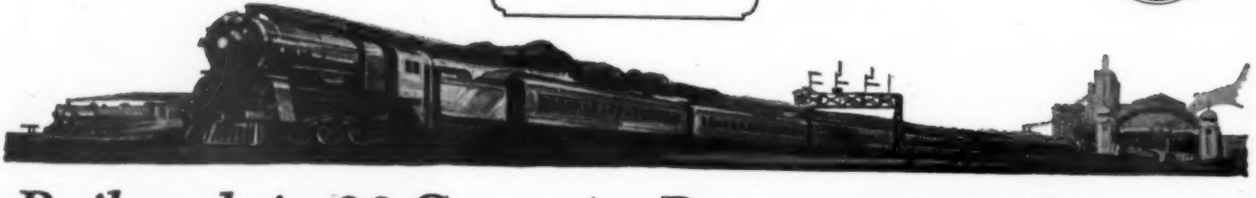
SKF INDUSTRIES
INCORPORATED
40 East 34th Street
New York, N. Y.

2073

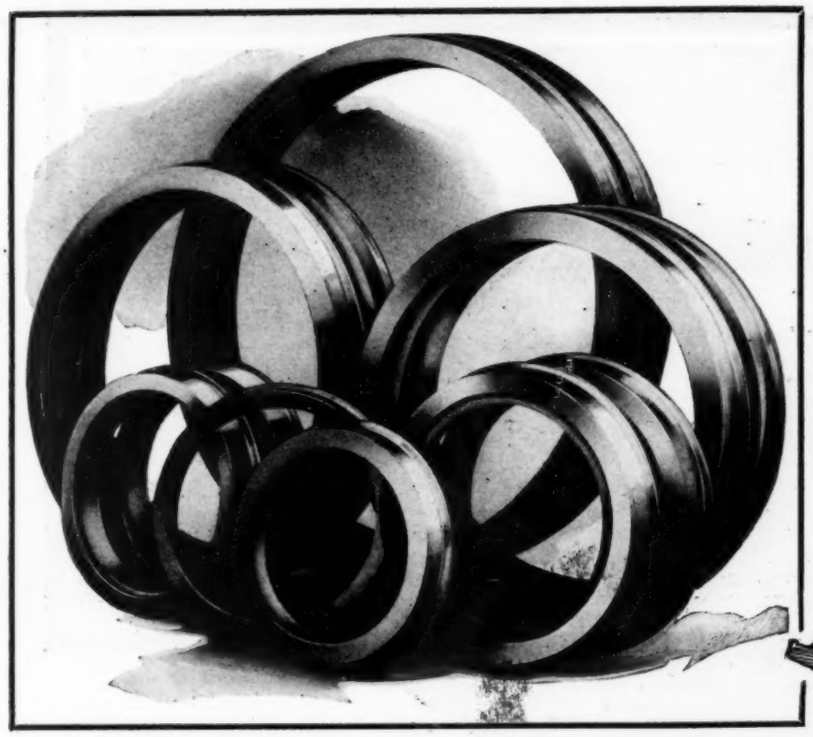
SKF

NOT
for a few months
FOR 12 YEARS
Not on a few journals
ON 25,000 JOURNALS
Not on a single Railroad
ON 45 RAILROADS
in
THIS COUNTRY
and
on the railroads
of
22 COUNTRIES
ABROAD

SKF
Puts the Right Bearing in the Right Place



Railroads in 22 Countries Run on SKF Bearings!



LOCOMOTIVE and CAR WHEEL TIRES

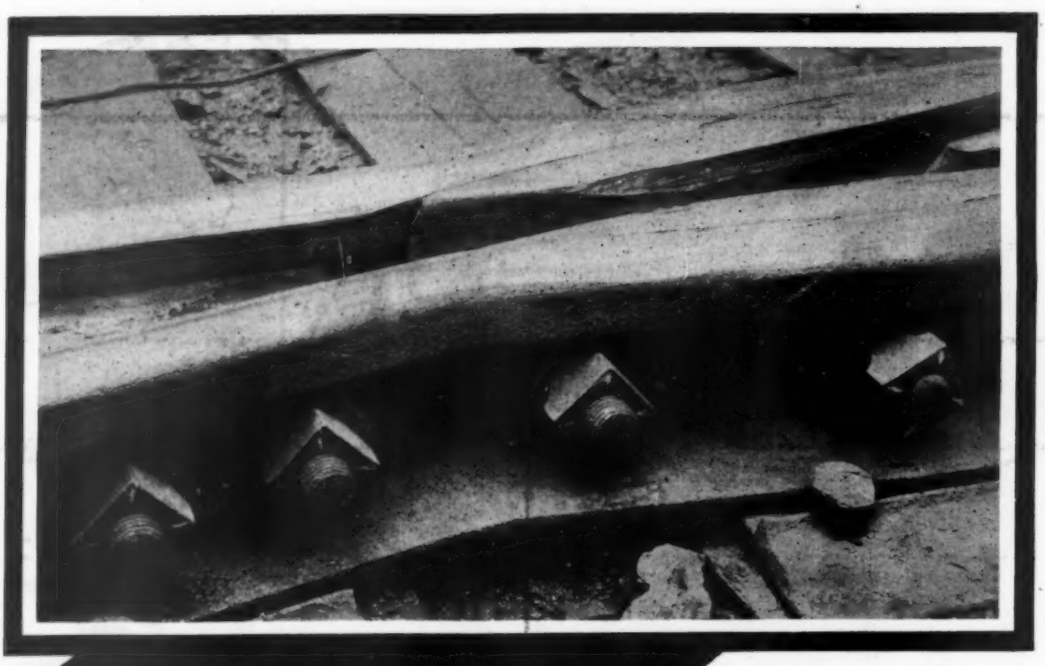
"LATROBE" and "INTER-OCEAN" tires for Locomotive Driving Wheels, Engine Truck, Tender Truck and Trailing Wheels have made remarkable records in all classes of service throughout the country. Steel manufactured in our own furnaces from raw material of the highest quality obtainable, combined with constant research and engineering experience are a guarantee of quality and service in "LATROBE" and "INTER-OCEAN" tires.

Railway Steel-Spring Company

30 CHURCH ST., NEW YORK

Branch Offices:

Chicago, Ill. Detroit, Mich. Richmond, Va. Pittsburgh, Pa. Montreal, Que.
St. Paul, Minn. Dallas, Texas. St. Louis, Mo. Denver, Colo. San Francisco, Cal.



"The Nut with the Star Crown"

At Last—A Trackbolt Nut that will not Jar Off

WHEN you consider the heavy pounding vibration to which frogs and track joints are continually subjected, you'll agree that here is an extraordinary job that requires an extraordinary unit nut. Selflock Unit Nuts are just that—an extraordinary unit nut in every sense of the word.

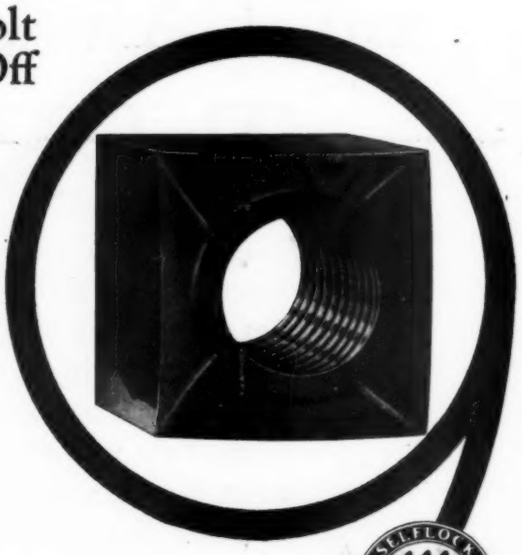
Every Selflock thread forms a gripping frictional lock on both sides of each bolt thread thus multiplying the gripping tenacity of ordinary unit nuts many times.

Selflocks are the only unit nuts that give 100% efficiency. They are easily applied and when wrenched tight defy the most intense vibration to loosen them.

All genuine Selflock Unit Nuts are identified by the Star Crown.

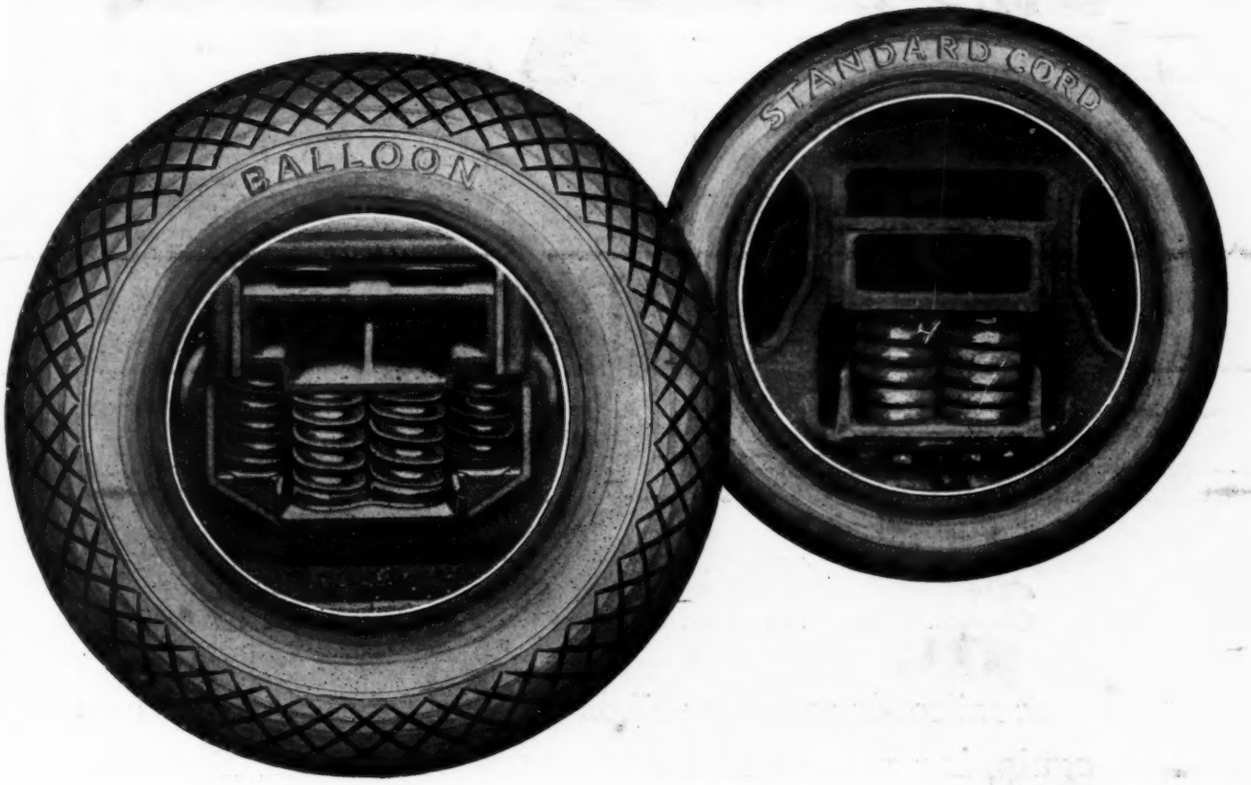
Specify Them

GRAHAM BOLT & NUT COMPANY
PITTSBURGH
Established 1874



"They lock on every thread"

SELFLOCK
(PATENTED)
UNIT NUTS



Just As "Balloons" Displaced High Pressure Tires

Dalman Trucks Are Displacing Ordinary Trucks—

And for Exactly the Same Reasons

Because of their greater spring capacity and wider load distribution, Dalman Trucks, as designed and built by Scullin, are better "shock cushions" between load and road.

They lengthen the life of cars, rails and roadbed; reduce damage to freight; save money all down the line.

For reasons of economy, if for no other, investigate Dalman Trucks, of Scullin design and construction.

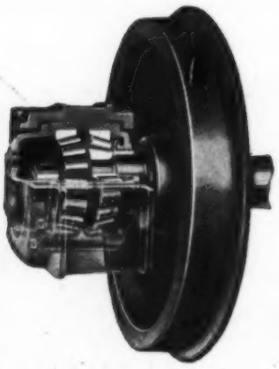
Scullin Steel Co.

St. Louis, Mo.

Sales Department: Security Bldg. General Offices and Works: 6700 Manchester Ave.
Baltimore, Md. Chicago, Ill. New York, N. Y. Richmond, Va. St. Paul, Minn.

Makers of Superior Steel Castings for Over a Quarter of a Century

L1155



Repeat Orders and First Orders

The first railroads to adopt Timken Bearings for car journals are equipping more and more cars with Timken Bearings.

Attracted by established Timken results, new roads are adopting Timken Bearings. And on those roads Timkens are repeating what has begun to be history on some other systems:

Timken Bearings reduce starting resistance 88%—

Timken Bearings assure the essential thrust capacity for railroad operation—

Timken Bearings make for compact simplicity at every step, beginning with the installation itself—

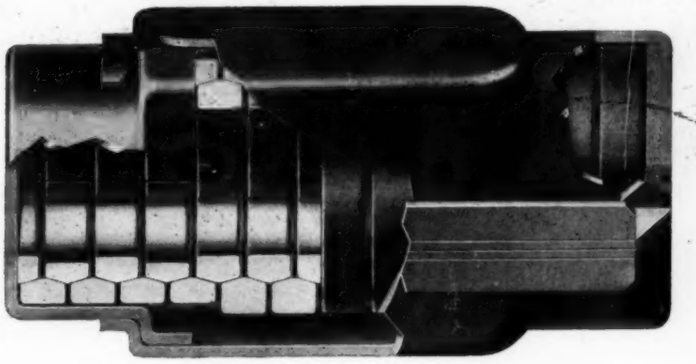
Timken Bearings, in brief, demonstrate the combination of endurance and anti-friction operating economies made possible only by Timken tapered construction, Timken *POSITIVELY ALIGNED ROLLS*, and Timken electric steel.

THE TIMKEN ROLLER BEARING CO., CANTON, OHIO

TIMKEN *Tapered Roller* **BEARINGS**

EQUIPMENT PROTECTION

NOT HERETOFORE AVAILABLE



The EDGEWATER RING SPRING DRAFT GEAR

Affords the protection necessary to keep your equipment in service. Made by the makers of Edgewater Locomotive and Car Wheel Tires and Rolled Steel Wheels.

EDGEWATER RING SPRING DRAFT GEAR

EDGEWATER STEEL COMPANY

Pittsburgh, Pa.

SALES OFFICES

New York, N. Y., Grand Central Terminal
Philadelphia, Pa. .....Liberty Bldg.
Portland, Ore. .....609 Upshur St.

Atlanta, Ga. .....Candler Bldg.
Baltimore, Md. .....Munsey Bldg.
Boston, Mass. .....53 Oliver St.
Chicago, Ill. .....Peoples Gas Bldg.
Louisville, Ky. .....Starks Bldg.
San Francisco, Cal. ..540 Brannan St.
St. Louis, Mo. ..Rwy. Exchange Bldg.
St. Paul, Minn. Merchants Bank Bldg.
Seattle, Wash. ....91 Connecticut St.
Washington, D. C. ....Munsey Bldg.

Controlled Tendencies

When the load from tipple or shovel strikes the gondola drop doors there is a tendency to distort them. Ajax Corrugated Doors have more than twice the strength of flat plate doors.

UNION METAL PRODUCTS CO.

New York Chicago Philadelphia
St. Louis Washington Richmond
Houston San Francisco
Kansas City Montreal

AJAX

CORRUGATED DROP DOORS

Passenger Car Journal Boxes
of
Pullmanite Metal

Standard on Pullman Cars
In Service all over the United States
Treated pedestal ways to resist wear, giving long life.

Pullman Car & Manufacturing Corporation

Works:
Pullman, Ill.
Michigan City, Ind.

General Offices
Chicago, Illinois

Eastern Sales Office
25 Broadway
New York

The Universal Dry Lading All-Steel Roof

"If there are 500 or 1,000 different sizes or designs of house cars running on American roads, on any one of which we may be called upon at any time to renew the roof in order to protect valuable lading, how much will we save in a year by adopting the Universal roof which will fit any one of them, instead of keeping in stock special material for each size and design?"

One size of parts will fit any size or design of car.

HUTCHINS CAR ROOFING COMPANY
DETROIT MICHIGAN
Established 1880

Apply The Test of Earning Power

THERE is only one true standard of locomotive performance. Not tractive power; nor boiler power but *earning power!*

Under modern operating conditions the right kind of locomotive can earn more than a locomotive ever earned before. But a locomotive built ten to twenty years ago is simply wasting the opportunity for improved earnings afforded by the recent improvement in track structure and permanent way.

Lima has built Super-Power Steam Locomotives for many kinds of operating conditions that are so far ahead of existing power in earning capacity as to render much of it obsolete.

A third less fuel; an increase of 40 to 50% in gross ton miles; an increase of 10 to 30% in speed. These are typical performances of Super-Power Locomotives.

Such records make it imperative to analyze the earning power of every locomotive on the road.

LIMA LOCOMOTIVE WORKS
Incorporated

It Takes Two To Make a Battery

A GOOD PITCHER and a good catcher are only effective when they work together. Each needs the other.

Similarly a good brick maker alone is ineffective as a supplier of Arch brick.

It takes the combination that exists with Harbison-Walker Refractories Company and American Arch Company to relieve the railroads of all concern over Arch brick.

American Arch Company contributes a broad knowledge of railroad conditions and an intensive study of locomotive combustion. It knows what is needed to give long life to Arch brick.

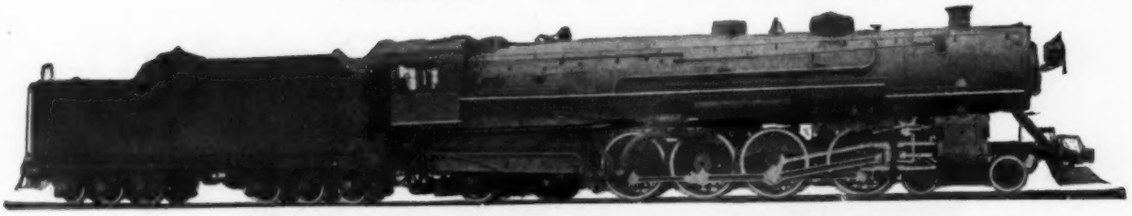
Harbison-Walker Refractories Company contributes not only ceramic advice of the highest order but also extensive manufacturing facilities that make it the world's largest producers of refractories.

Working together, these two companies give assurance that Arch brick will be exactly suited to varying combustion conditions; will be made properly, and will always be on hand wherever and whenever needed.

Harbison-Walker Refractories Co.
Refractory Specialists

American Arch Co.
INCORPORATED
Locomotive Combustion
. . . Specialists . . .

TRACTIVE EFFORT INCREASED 20%



Main Engine—	57,500 lbs.	Tractive Effort
Booster—	11,400 lbs.	Tractive Effort
Total—	68,900 lbs.	Tractive Effort
Steam Pressure—	210 lbs.	

An Integral Part Of the 4-8-4

Type of Locomotive	*Kind of Application*
	Passenger Power
4- 4-2	Trailer Application
4- 6-2	Trailer Application
2- 6-2	Trailer Application
4- 6-4	Trailer Application
4- 8-2	Trailer Application
4- 8-4	Trailer Application
4-10-2	Trailer Application
	Switch and Bump Power
0- 6-0	Reversible Booster on front tender truck.
0- 8-0	Reversible Booster on both tender trucks or on one truck.
0-10-0	Reversible Booster on both tender trucks or on one truck.
2-8-8-2	Reversible Booster on both tender trucks or on one truck.
	Freight Power
2- 8-0	On front tender truck
2- 8-2	On front tender truck or on trailer
2- 8-4	On front tender truck or on trailer or trailer application with side rods
2-10-2	On front tender truck, on trailer or both
2-10-4	On front tender truck or on trailer or trailer application with side rods
4-12-2	On front tender truck, on trailer or both
2-10-0	On front tender truck or on both trucks.

FOLLOWING the example of other types of locomotives, the four wheel trailer has been used to give increased steaming capacity to the mountain type locomotive.

The new 4-8-4 locomotives are ample in steaming power to handle the heaviest passenger trains over the mountain grades.

The Locomotive Booster is built into this new type as an integral part of the design. Its function is to supply power for starting and accelerating the heavy trains to road speed. It will add 20% increased tractive effort when called upon and gives this type the ability to start the heavy load it can handle at road speed.

FRANKLIN

RAILWAY SUPPLY COMPANY, INC.

The Locomotive Booster Capitalizes Idle Weight and Spare Steam

NEW YORK CHICAGO ST. LOUIS SAN FRANCISCO MONTREAL

Better Protection for Gas Rail Car Operation

Operation of gas and gas-electric rail cars can now have an additional safeguard by virtue of the "Safety Control" feature which may be incorporated in the air brake equipment.

This feature, which is similar to that being used on several thousand street cars, provides for automatic stopping of the car if the operator becomes physically disabled. It comprehends the interlocking of car control and brakes in such a way that if the operator takes his hand from the brake valve without first having built up a predetermined cylinder pressure, the power is shut off and an emergency brake application made.

Our representative will be glad to explain the details of this feature. Your consideration of its advantages will be worth while.

WESTINGHOUSE AIR BRAKE CO.

General Office and Works, Wilmerding, Pa.

New York Washington Pittsburgh Chicago St. Louis San Francisco

THERE IS MORE THAN STEEL IN ALCO FORGINGS

We have shown with what care the steel for Alco forgings is selected; the pains taken in its preparation, and how thoroughly analytical inspection is conducted. We have discussed the important subject of heating. Let us now take up the subject of heat-treating.

A modern forging plant would not be complete without the best in heat-treating facilities, because manufacturing is not complete until the forging has been heat-treated, tested and found to meet the specified requirements. All the furnaces are equipped with a perforated arch which keeps the flame from coming in direct contact with the materials being heated, and more evenly distributes the heat into the mass.

Forgings are loaded on the car hearth, each piece being placed on cast iron blocks which raise it about 4 in. from the hearth. Space is allowed around each of the forgings, which are charged in single tiers, all of which enables complete and uniform radiation and proper heat penetration. The annealing furnaces are equipped with indicating and recording pyrometers which write a complete history of the treatment. Each heat is also checked by the use of a water pyrometer.

Most of the forgings are normalized and annealed, but to take care of such forgings as are specified to be quenched, a tank is installed. The quenching medium is cooled by a motor-driven circulating pump which passed the liquid through cooling coils in a vertical water cooler. All of the quenched forgings are given a proof test under a drop testing machine.

To complete the work, a modern laboratory with chemical and physical facilities is provided, all being real factors in the production of high quality forgings.

Alco forgings, containing much more than steel, help to give that ultimate freedom from failure and lasting service life demanded today from power both old and new.

Alco forging shop facilities are unapproached in men, methods and equipment. These could not be duplicated in any railroad shop except at a prohibitive cost.

AMERICAN LOCOMOTIVE COMPANY

30 CHURCH STREET **NEW YORK CITY**

Being one of a series of forging talks in the Railway Mechanical Engineer.

BARCO
Power Reverse Gear

BARCO
Flexible
Joint

BARCO
3V Engine-
Tender
Connection

Railway Devices of Acknowledged Merit

Working models of which were accorded a great deal of attention at Atlantic City

BARCO

Manufacturing Company

1801 Winnemac Avenue, Chicago, Illinois

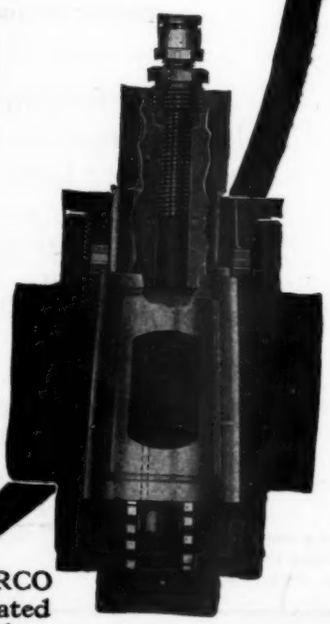
THE HOLDEN CO., LTD.

In Canada
Montreal, Moncton, Toronto

In Canada
Winnipeg, Vancouver

Catalogs and blue prints available.

BARCO
Steam Heat Connection



BARCO
Lubricated
Plug Valve

RA6-30-Gray

New Administration Building
at the
Baldwin Plant

The greater part of the Executive Staff of The Baldwin Locomotive Works is now housed in the recently completed Baldwin Administration Building in the heart of our plant at Eddystone, Pa., about twelve miles southwest of Philadelphia.

The occupation of this Administration Building completes the transfer of all of our departments to Eddystone. Offices will also be maintained in Philadelphia so that the names "Baldwin" and "Philadelphia" will continue to be linked together as they have been for nearly a century.

Our Eddystone Plant, equipped with every modern facility for the designing and building of locomotives to meet every need, is located in the center of a fast growing industrial section. It has direct track connection with three important railroads, and its own docks for the shipment of locomotives or manufactured materials to any port in the world.

THE BALDWIN LOCOMOTIVE WORKS
PHILADELPHIA

HUNT-SPILLER GUN IRON

Economy

TO make every locomotive produce the utmost for the lowest *practical* maintenance cost is the objective of every railroad.

There is always some connection between the cost of material, and the cost of using it—those that wear longest are least expensive.

The ability of HUNT-SPILLER IRON to resist frictional wear and high superheat temperatures assures efficient locomotive performance with a big savings in fuel and maintenance costs.

Cylinder Bushings
Cylinder Packing Rings
Pistons or Piston Bull Rings
Valve Bushings
Valve Packing Rings
Valve Bull Rings
Crosshead Shoes
Hub Liners
Shoes and Wedges
Floating Rod Bushings

HUNT-SPILLER MFG. CORPORATION
J. G. Platt, Pres. & Gen. Mgr. V. W. Ellet, Vice-President

Office & Works
383 Dorchester Ave. South Boston, 27, Mass.

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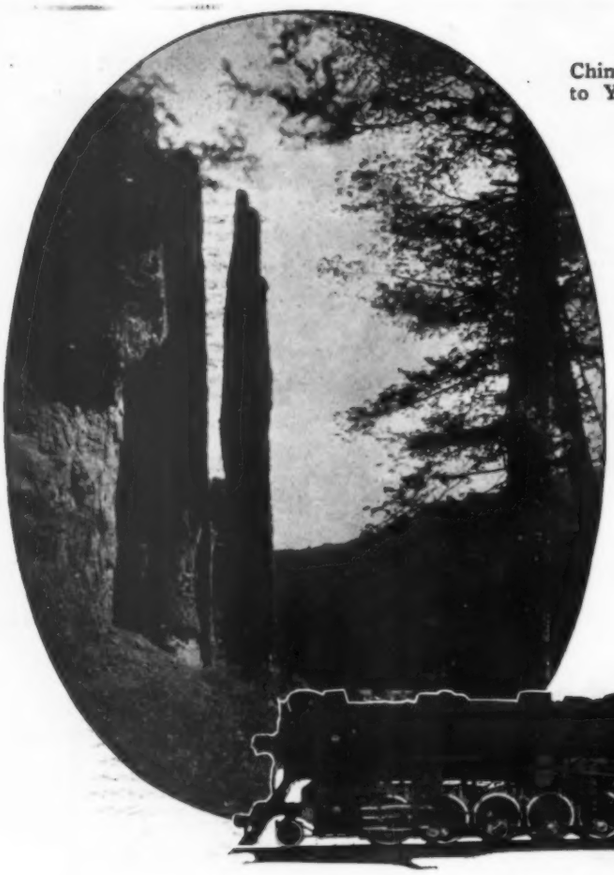
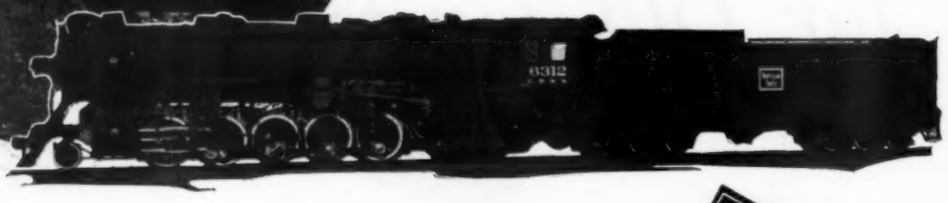


Chimney Rock at Cody Entrance
to Yellowstone Park
—on the Burlington Route

On the twelve 2-10-4 type locomotives built recently by The Baldwin Locomotive Works for Chicago, Burlington & Quincy Railroad, important forgings are made of Vanadium Steel.



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New Freight Power for the Burlington Route *with Forgings of Vanadium Steel*

LATE in 1927, twelve 2-10-4 type locomotives for freight service were delivered to Chicago, Burlington & Quincy Railroad by The Baldwin Locomotive Works. Embodying a number of improvements in design, these new locomotives develop a tractive force of 90,000 pounds with a total engine and tender weight of 897,900 pounds.

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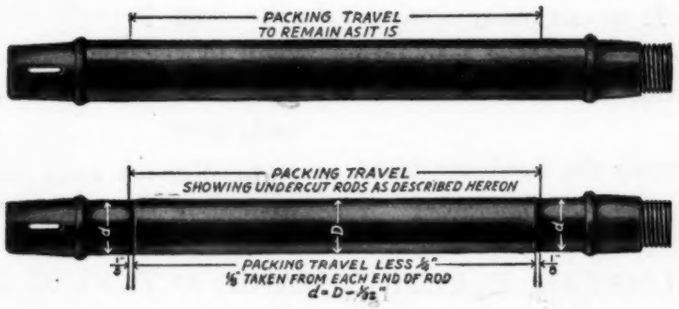

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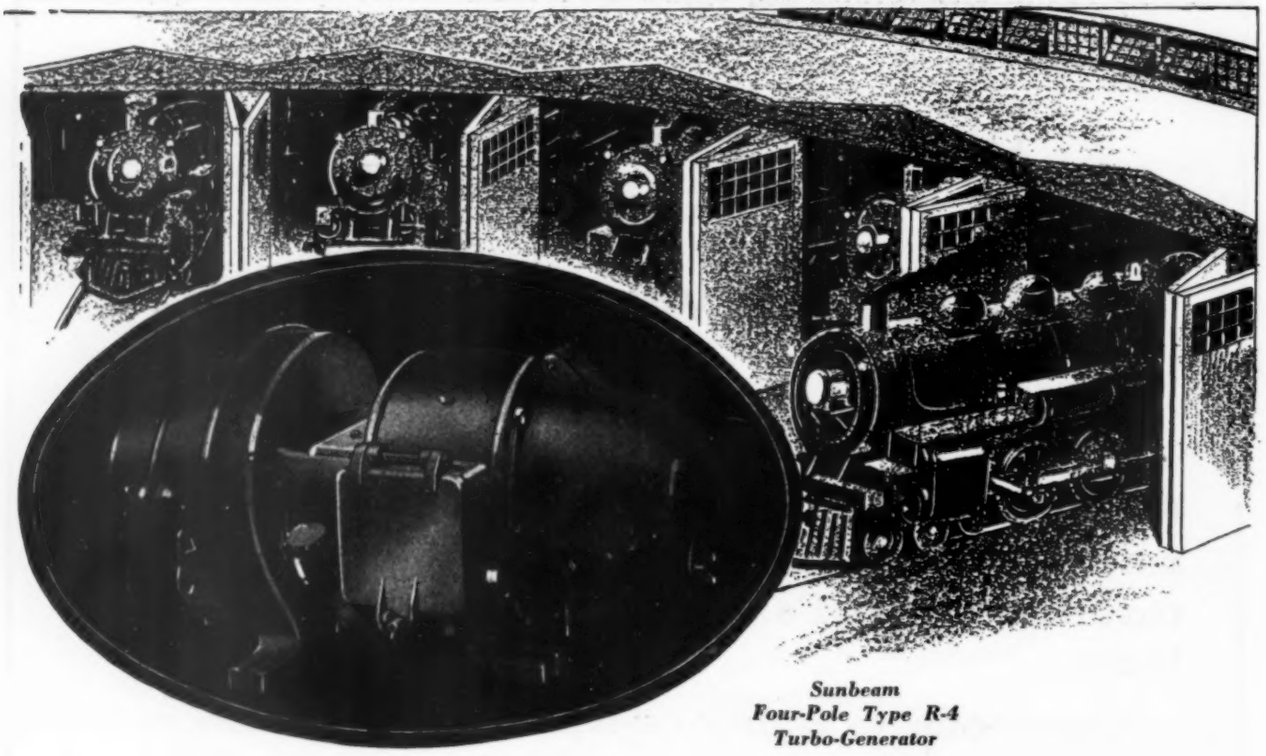

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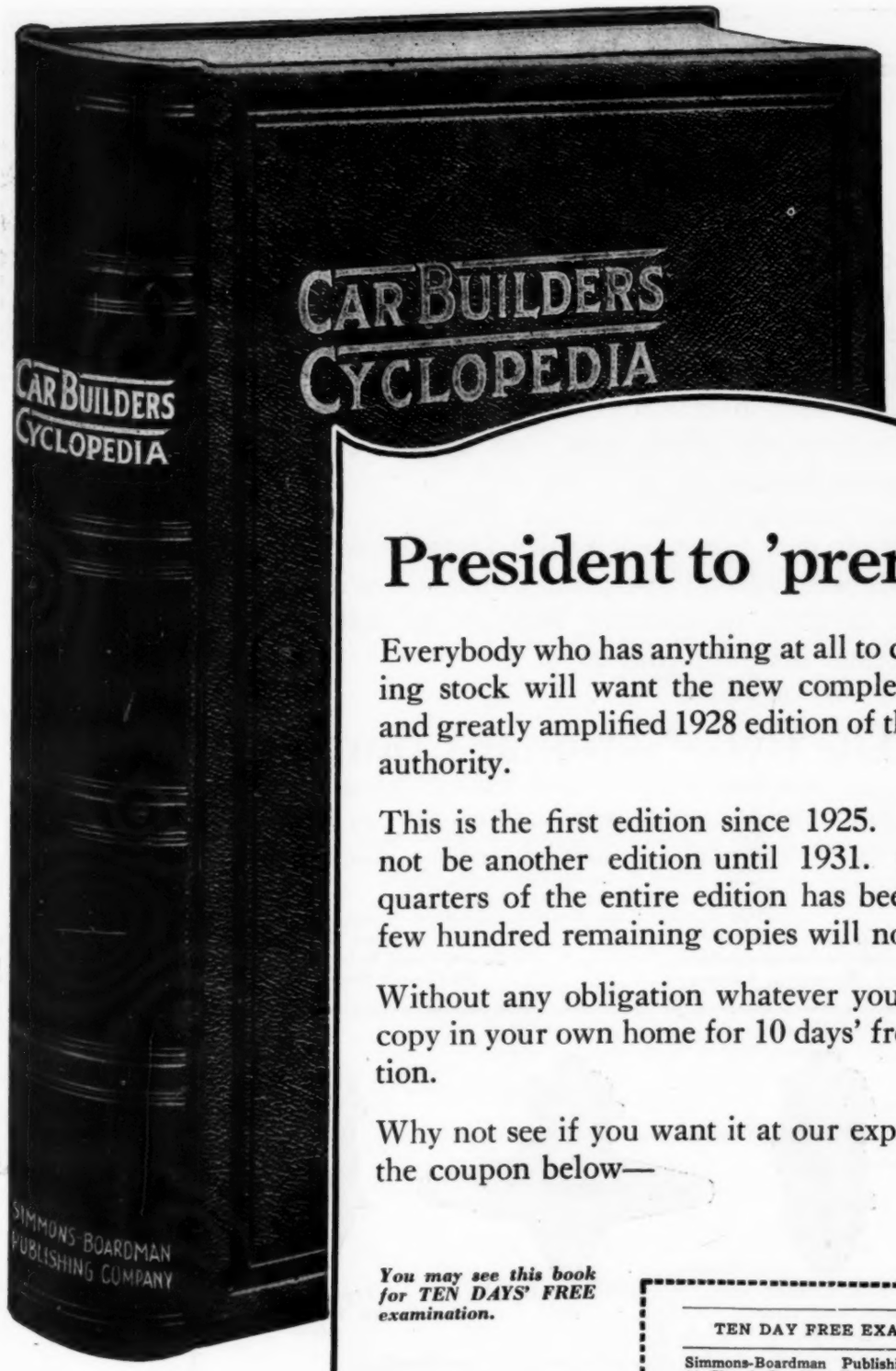

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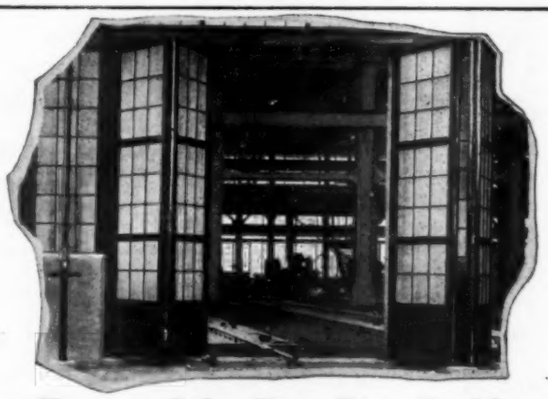

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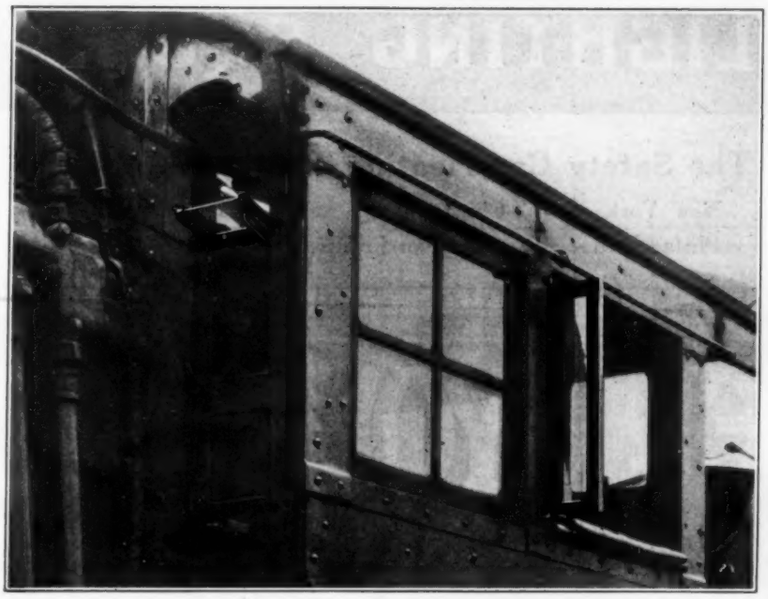

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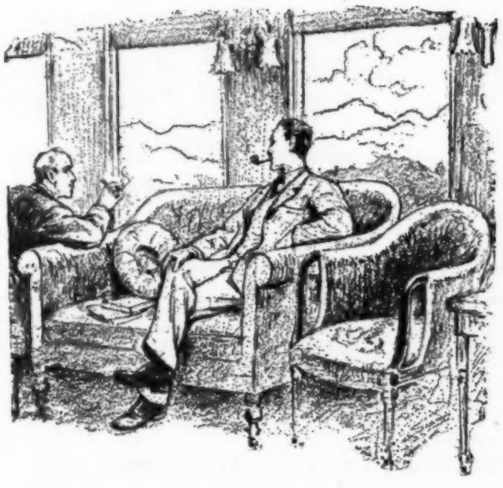

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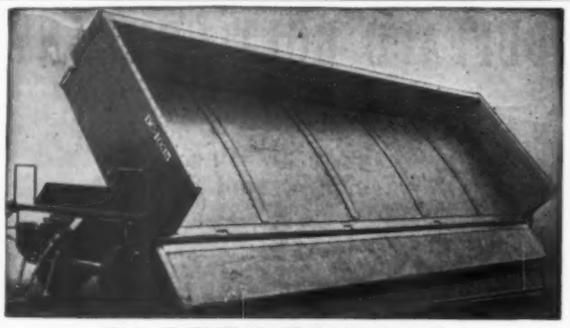
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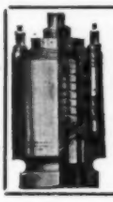

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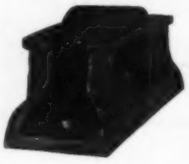
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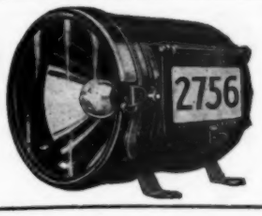

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June 9, 1928

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IF you are open to overtures for new connection, and qualified for a salary between $2,500 and $25,000, your response to this announcement is invited. The undersigned provides a thoroughly organized service, of recognized standing and reputation, through which preliminaries are negotiated confidentially for positions of the calibre indicated. The procedure is individualized to each client's personal requirements; your identity covered and present position protected. Established seventeen years. Send only name and address for details. R. W. Bixby, Inc., 102 Downtown Building, Buffalo, New York.

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Chicago Railway Equipment Co.

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Mt. Vernon Car Mfg. Co.
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Chicago Railway Equipment Co.
Pressed Steel Car Co.

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Mt. Vernon Car Mfg. Co.
National Railway Appliance Co.

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Fort Pitt Malleable Iron Co.
Mt. Vernon Car Mfg. Co.

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Westinghouse Air Brake Co.

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Michigan Wood Preserving Co.
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Owen Bucket Co., The.

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Buckets, Orange Peel.
Industrial Brownhoist Corp.

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Owen Bucket Co., The.

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Arnold Engineering Co., The.
Faile & Co., E. H.
United Engineers & Constructors, Inc.

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Buildings, Steel.
American Bridge Co.

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Ryerson & Son, Joseph T.

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Pressed Steel Car Co.

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Pressed Steel Car Co.

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Pressed Steel Car Co.

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Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.
Western Wheeled Scraper Co.

Cars, Caboose, Coal & Stock
Mt. Vernon Car Mfg. Co.

Cars, Convertible.
Mt. Vernon Car Mfg. Co.

Cars, Dump.
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Differential Steel Car Co.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.
Western Wheeled Scraper Co.

Cars, Flat, Narrow Gauge.
Western Wheeled Scraper Co.

Cars, Freight.
Bethlehem Steel Co.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.

Cars, Freight (New and Repaired.
Pressed Steel Car Co.

Cars, Gasoline-Electric.
Electro-Motive Co.

Cars, Industrial.
Bethlehem Steel Co.
Pressed Steel Car Co.
Western Wheeled Scraper Co.

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Cars, Motor.
Woolery Machine Co.

Cars, Ore.
Pressed Steel Car Co.

Cars, Passenger.
Electro-Motive Co.
Pressed Steel Car Co.

Cars, Power Units.
Electro-Motive Co.

Cars, Quarry.
Western Wheeled Scraper Co.

Cars, Rebuilt and Repaired.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.

Cars, Rebuilt, Repaired and Second Hand.
Western Wheeled Scraper Co.

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Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.

Cars, Second-Hand.
Pressed Steel Car Co.

Cars, Section.
Woolery Machine Co.

Cars, Self-Propelled Passenger.
Electro-Motive Co.

Cars, Spreader.
Jordan Co., O. F.
Western Wheeled Scraper Co.

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Bethlehem Steel Co.
Pressed Steel Car Co.

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Western Wheeled Scraper Co.

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National Bearing Metals Corp.

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Edgewater Steel Co.
McConway & Torley Co.
Pratt & Letchworth Co.
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Scullin Steel Co.
Standard Steel Works Co.
Union Spring & Mfg. Co.
Union Steel Casting Co.

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Pratt & Letchworth Co.
Scullin Steel Co.
Union Steel Casting Co.

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McConway & Torley Co.
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Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Barge.
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Ohio Locomotive Crane Co.

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Ohio Locomotive Crane Co.

Cranes, Electric Traveling
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Cranes, Gantry.
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Niles-Bement-Pond Co.
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Cranes, Gasoline
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Hand Power.
Niles-Bement-Pond Co.

Cranes, Jib.
Industrial Brownhoist Corp.

Cranes Locomotive.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Pillar
Industrial Brownhoist Corp.

Cranes, Portable.
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Cranes, Tractor.
Industrial Brownhoist Corp.

Cranes, Tractor Crawling.
Industrial Brownhoist Corp.

Cranes, Transfer.
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Cranes, Wall & Jib.
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Cranes, Wharf.
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Curb Bars.
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Curtains & Fixtures, Car Window.
National Lock Washer Co., The.

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Niles-Bement-Pond Co.

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Engineers, Valuation.
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Ferro Vanadium.
Vanadium Corp. of America

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Crane Company.

Flangers, Snow.
Q & C Co., The.

Floodlights.
Electric Service Supplies Co.
Pyle-National Co.

Floor Slabs, Concrete.
American Cement Tile Mfg Co.

Flooring.
Century Wood Preserving Co.
Industrial Lumber Co.
Jennison Wright Co.,
Johns-Manville Corp.
Michigan Wood Preserving Co.
New England Wood Preserving Co.
Ohio Wood Preserving Co.
Pittsburgh Wood Preserving Co.

Flooring, Composition.
Johns-Manville Corp.

Flooring, Wood.
Century Wood Preserving Co.
Industrial Lumber Co.
Michigan Wood Preserving Co.
New England Wood Preserving Co.
Ohio Wood Preserving Co.
Pittsburgh Wood Preserving Co.

Flue Cleaners—(See Cleaners, Flue).

Flue Cutters—(See Cutters, Flue.)

Flue Shop Equipment.
Ryerson & Son, Joseph T.

Flues, Boiler — (See Tubes Boiler).

Forges, Rivet Heating.
Ryerson & Son, Jos. T.

Forgings.
American Bridge Co.
American Steel Foundries.
Bethlehem Steel Co.
Carnegie Steel Co.
Edgewater Steel Co.
Illinois Steel Co.
Mt. Vernon Car Mfg. Co.
National Railway Appliance Co.
Neely Nut & Bolt Co.
Pressed Steel Car Co.
Standard Steel Works Co.

Frames, Locomotive.
American Locomotive Co.
American Steel Foundries.
Baldwin Locomotive Wks.
Pratt & Letchworth Co.
Scullin Steel Co.
Union Steel Casting Co.

Frames, Truck.
American Locomotive Co.
American Steel Foundries.
Baldwin Locomotive Wks.
Buckeye Steel Castings Co.
Franklin Railway Supply Co., Inc.
Pressed Steel Car Co.
Scullin Steel Co.
Symington Co., The.

Frames, Vanadium.
American Locomotive Co.
Baldwin Locomotive Wks.
Pratt & Letchworth Co.
Union Steel Casting Co.

Frogs and Crossings.
Bethlehem Steel Co.
Ramapo Ajax Corp.

Fulcrums, Brake Beam.
American Steel Foundries.
Chicago Railway Equipment Co.

Furnaces, Rivet Heating — (See Forges, Rivet Heating).

Gage Testers—(See Testers, Gage).

Gages, Steam.
Ashton Valve Co.

Gages, Water Press. Recording.
Ashton Valve Co.

Gear Blanks, Rolled Steel.
Standard Steel Works Co.

Gears and Pinions.
American Steel Foundries.
National Railway Appliance Co.

Gears, Valve — (See Valve Gears).

Generators, Car Lighting.
Safety Car Heating & Lighting Co.

Generators, Electric.
American Brown Boveri Electric Corp.
Electric Service Supplies Co.
Pyle-National Co.
Sunbeam Electric Mfg. Co.

Graders, Elevating.
Western Wheeled Scraper Co.

Grapples, Wood.
Industrial Brownhoist Corp.

Grate Bars.
Q & C Co., The.

Grate Shakers, Automatic.
Franklin Railway Supply Co., Inc.

Grease Forming Machine.
Franklin Railway Supply Co., Inc.

Guard Rail, One Piece.
Bethlehem Steel Co.
Ramapo Ajax Corp.

Guard Rails, Foot Guard.
Q & C Co., The

Guard, Switch Point.
Q & C Co., The.

Guards, Cattle.
American Bridge Co.

Guards, Dust.
Symington, Co., The.

Guards, Incandescent Lamps.
Electric Service Supplies Co.

Hair Felt.
Johns-Manville Corp.

Hammers, Drop.
Niles-Bement-Pond Co.

Hammers, Pneumatic Forging
Niles-Bement-Pond Co.

Hammers, Steam.
Industrial Brownhoist Corp.

Hammers, Steam Forging.
Niles-Bement-Pond Co.

Hand Brakes—(See Brakes, Hand).

Hangers, Ball Bearing.
S K F Industries, Inc.

Hangers, Bottom Rod, Safety
Chicago Railway Equipment Co.

Hangers, Car Door — (See Fixtures, Car Door).
Ryerson & Son, Jos. T.

Headlights, Electric.
Electric Service Supplies Co.
Pyle-National Co.
Sunbeam Electric Mfg. Co.

Headlight Reflectors and Cases.
Electric Service Supplies Co.
Pyle-National Co.
Sunbeam Electric Mfg. Co.

Headlight Repair Parts, Electrical.
Electric Service Supplies Co.
Pyle-National Co.
Sunbeam Electric Mfg. Co.

Heaters, Electric.
Gold Car Htg. & Ltg. Co.

Heaters, Feed Water.
Superheater Co., The.

Heaters, Feed Water, Locomotive.
Superheater Co., The.

Heaters, Feed Water Stationary.
Smith Heater & Mfg. Co., Peter.

Heating Equipment, Car.
Gold Car Heating & Lighting Co.
Safety Car Heating & Lighting Co.
Smith Heater & Mfg. Co., Peter.
Vapor Car Heating Co., Inc.

Heating Systems, Car (Electric and Steam).
Gold Car Htg. & Ltg. Co.
Safety Car Heating & Lighting Co.
Smith Heater & Mfg. Co., Peter.
Vapor Car Heating Co., Inc.

Heating and Ventilating Apparatus.
Gold Car Htg. & Ltg. Co.
National Railway Appliance Co.
Smith Heater & Mfg. Co., Peter.
Vapor Car Heating Co., Inc.

Hoisting Machinery.
American Bridge Co.
Industrial Brownhoist Corp.

Hoists, Chain.
Ryerson & Son, Joseph T.

Hoists, Electric.
Niles-Bement-Pond Co.

Hoists, Hand.
Niles-Bement-Pond Co.

Hoists, Second-Hand.
Hyman-Michaels Co.

Hose, Air, Steam, Etc.
Westinghouse Air Brake Co.

Hose, Tender.
Prime Mfg. Co., The.

Hydraulic Machinery.
Niles-Bement-Pond Co.

Ice Cutters.
Jordan Co., O. F.

Ingots.
Carnegie Steel Co.
Edgewater Steel Co.
Illinois Steel Co.

Injectors, Exhaust Steam.
Superheater Co., The.

Inspection of Material and Equipment — (See Engineers, Inspection).

Insulation, Car.
Johns-Manville Corp.
National Railway Appliance Co.

Insulation, Electrical.
Electric Service Supplies Co.
Johns-Manville Corp.

Insulation, Exhaust & Heater Pipe.
Johns-Manville Corp.

Insulation, Heat.
Johns-Manville Corp.
Miner, W. H.

Iron Chain.
Falls Hollow Staybolt Co.

Iron Charcoal.
Ewald Iron Co.
Falls Hollow Staybolt Co.

Iron, Hollow Staybolt.
Falls Hollow Staybolt Co.

Iron, Hollow Staybolt Bars.
Falls Hollow Staybolt Co.

Iron, Pig.
Bethlehem Steel Co.
Illinois Steel Co.

Iron, Refined.
Ewald Iron Co.
Falls Hollow Staybolt Co.
National Railway Appliance Co.
Ryerson & Son, Joseph T.

Iron Staybolt—See also Staybolts).
Bethlehem Steel Co.
Ewald Iron Co.
Falls Hollow Staybolt Co.
Ryerson & Son, Joseph T.

Jacks, Smoke.
Johns-Manville Corp.

Joints, Air Reservoir.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Joints, Blow Off Line (Roundhouse).
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Joints, Coach and Coach Yard Steam.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Joints, Flexible.
Vapor Car Heating Co., Inc.

Joints, Flexible Ball.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Joints, Rail.
American Steel Foundries.
Carnegie Steel Co.
Illinois Steel Co.
Q & C Co., The.

Joints, Steam, Air and Liquid
Barco Mfg. Co.
Franklin Ry. Supply Co.
Vapor Car Heating Co., Inc.

Joints, Swing.
Barco Mfg. Co.
Vapor Car Heating Co., Inc.

Journal Boxes and Lids.
American Steel Foundries.
Hunt-Spiller Mfg. Corp.
Railway Steel Spring Co.
Symington Co., The.
Union Spring & Mfg. Co.

Keys, Brake Shoe.
Mt. Vernon Car Mfg. Co.

Knuckles, Emergency.
Q & C Co., The.

Laboratories, Testing.
Hunt Co., Robert W.

Lagging, Locomotive.
Johns-Manville Corp.

Lamps, Incandescent.
Electric Service Supplies Co.

Lath, Metal.
Truscon Steel Co.

Lathes, Axle.
Niles-Bement-Pond Co.

Lathes, Car Wheel.
Niles-Bement-Pond Co.

Lathes, Driving Wheel.
Niles-Bement-Pond Co.

Lathes, Engine.
Niles-Bement-Pond Co.
Ryerson & Son, Joseph T.
Safety Car Heating & Lighting Co., The.

Lathes, Extension & Gap.
Niles-Bement-Pond Co.

Lathes, Journal Truing.
Niles-Bement-Pond Co.

Lead, White.
National Lead Co.

Lighting Equipment Car.
National Railway Appliance Co.
Safety Car Heating & Lighting Co.

Lighting Fixtures and Systems.
Electric Service Supplies Co.
Pyle-National Co.
Safety Car Heating & Lighting Co.

Line Material.
Electric Service Supplies Co.

Lock Nuts (See Nut Locks).

Locomotive Frame Drilling Machines.
Niles-Bement-Pond Co.

Locomotive Repair Parts.
American Locomotive Co.
Baldwin Locomotive Wks., The.
Lima Locomotive Works.
National Railway Appliance Co.

Locomotives, Contractors'.
American Locomotive Co.
Baldwin Locomotive Wks.
Lima Locomotive Works.

Locomotives, Diesel.
American Brown Boveri Electric Corp.

Locomotives, Electric.
American Locomotive Co.
Baldwin Locomotive Wks.

Locomotives, Gas-Electric.
Electro-Motive Co.

Locomotives, Gasoline.
Baldwin Locomotive Wks.

Locomotives Geared.
Lima Locomotive Works, Inc.

Locomotives, Industrial.
American Locomotive Co.
Baldwin Locomotive Wks.
Lima Locomotive Works, Inc.

Locomotives, Mine.
American Locomotive Co.
Baldwin Locomotive Wks.
Lima Locomotive Works.

Locomotives, Oil Engine Electric Driven.
American Locomotive Co.
General Electric Co.
Ingersoll-Rand Co.

Locomotives, Rebuilt.
American Locomotive Co.

Locomotives, Second-Hand.
Hyman-Michaels Co.

Locomotives, Steam.
American Locomotive Co.
Baldwin Locomotive Wks.
Lima Locomotive Works, Inc.

Lubricators, Driving Box.
Franklin Railway Supply Co., Inc.

Lubricators, Piston Rods.
Q & C Co., The.

Lumber.
Industrial Lumber Co.

Lumber, Asbestos.
Johns-Manville Corp.

Lumber, Creosoted.
Century Wood Preserving Co.
International Creosoting & Construction Co.
Jennison-Wright Co.
Michigan Wood Preserving Co.
New England Wood Preserving Co.
Ohio Wood Preserving Co.
Pittsburgh Wood Preserving Co.
Prettyman & Sons, J. F.

Magnets, Lifting.
Industrial Brownhoist Corp.

Mechanical Draft Apparatus —(See Heating and Vent. App.).

Melters, Snow, Electric.
Q & C Co., The.

Metal Tile & Domes.
Truscon Steel Co.

Milling Machines, Horizontal Plain.
Niles-Bement-Pond Co.

Milling Machines, Plain and Universal.
Ryerson & Son, Joseph T.

Milling Machines, Slab.
Niles-Bement-Pond Co.

Milling Machines, Vertical.
Niles-Bement-Pond Co.

Molybdenum Metal.
Vanadium Corp. of America.

Nipples, Air Hose.
Prime Mfg. Co., The.

Nozzles, Exhaust.
Franklin Railway Supply Co.

Nuts—(See Bolts and Nuts).

Nut Locks.
Columbia Nut & Bolt Co.
Graham Bolt & Nut Co.
Grip Nut Co., The.
National Lock Washer Co., The.
National Railway Appliance Co.

Nuts, Tank Hose.
Prime Mfg. Co., The.

Oil Cups.
Crane Company.

Oil, Electric Locomotives.
American Locomotive Co.
General Electric Co.
Ingersoll-Rand Co.

Oil, Linseed.
National Lead Co.

Oil Plugs, Steam Chest.
Franklin Railway Supply Co., Inc.

Packing, Air Pump.
Johns-Manville Corp.
Pilot Packing Co.

Packing, Cab Cock.
Johns-Manville Corp.

Packing, Cylinder & Valve Ring.
Hunt-Spiller Mfg. Corp.

Packing, Locomotive.
Johns-Manville Corp.

Packing, Metallic.
Paxton-Mitchell Co.

Packing, Semi-Metallic.
Pilot Packing Co.

Packing, Sheet.
Johns-Manville Corp.

Packing, Soft.
Crane Company.
Johns-Manville Corp.
Pilot Packing Co.

Packing, Throttle.
Johns-Manville Corp.

Paint, Metal Protective.
National Lead Company.
National Railway Appliance Co.

Paints.
National Lead Company.
National Railway Appliance Co.

Pile Drivers.
Industrial Brownhoist Corp.

Piling.
Prettyman & Sons, J. F.

Piling, Creosoted.
International Creosoting & Construction Co.
Jennison-Wright Co.

Piling, Creosoted Wood.
Century Wood Preserving Co.
International Creosoting & Construction Co.
Jennison-Wright Co.
Michigan Wood Preserving Co.
New England Wood Preserving Co.
Ohio Wood Preserving Co.
Pittsburgh Wood Preserving Co.

Piling, Sheet Steel.
American Bridge Co
Bethlehem Steel Co.
Carnegie Steel Co.

Pilot Beams, Cast Steel.
Scullin Steel Co.

Pins, Center.
Miner, W. H.

Pins, Crank.
American Locomotive Co.
Baldwin Locomotive Works.
Miner, W. H.

Pipe Coverings.
Johns-Manville Corp.
Union Asbestos & Rubber Co.

Pipe Fittings—(See Fittings, Pipe).

Pipe, Metal, Culvert.
American Sheet & Tin Plate Co.

Planers.
Ryerson & Son, Joseph T.

Planers, Rotary.
Niles-Bement-Pond Co.

Plates, Boiler, Firebox—(See, Steel Firebox).

Plates, Center—(See Bearings, Center).

Plates, Iron and Steel.
Bethlehem Steel Co.
Carnegie Steel Co.
Illinois Steel Co.
Ryerson & Son, Joseph T.

Plates, Monel Metal.
International Nickel Co.

Plates, Nickel.
American Mond Nickel Co.

Plates, Tie.
Bethlehem Steel Co.
Illinois Steel Co.
Scullin Steel Co.

Plows, Railroad and Grading.
Western Wheeled Scraper Co.

Plows, Snow.
American Locomotive Co.
Jordan Co., O. F.
National Railway Appliance Co.
Q & C Co., The.

Plugs, Oil & Grease Cup.
Prime Mfg. Co., The.

Plugs, Washout.
Prime Mfg. Co., The.

Plush, Mohair.
Massachusetts Mohair Plush Co.

Poles.
Prettyman & Sons, J. F.

Poles, Creosoted.
Century Wood Preserving Co.
International Creosoting & Construction Co.
Michigan Wood Preserving Co.
New England Wood Preserving Co.
Ohio Wood Preserving Co.
Pilot Packing Co.
Pittsburgh Wood Preserving Co.

Posts, Steel Fence.
Q & C Co., The.

Powder, Blasting—(See Explosives).

Powdered Coal Equipment.
Muhlfeld, John E.

Power Plants.
Muhlfeld, John E.
United Engineers & Constructors, Inc.

Preservatives, Wood.
Century Wood Preserving Co.
Jennison-Wright Co.
Michigan Wood Preserving Co.
New England Wood Preserving Co.
Ohio Wood Preserving Co.
Pittsburgh Wood Preserving Co.

Presses, Bushing.
Niles-Bement-Pond Co.

Presses, Forging.
Niles-Bement-Pond Co.

Presses, Hydraulic.
Niles-Bement-Pond Co.

Presses, Wheel.
Niles-Bement-Pond Co.

Pulverizers, Coal—(See Crushers, Coal).

Punching and Shearing Machines.
Ryerson & Son, Joseph T.

Pyrometers, Superheated Steam.
Superheater Co., The.

Quartering Machine.
Niles-Bement-Pond Co.

Rail Anchors.
P. & M. Company, The.

Rail-Bonds.
Electric Service Supplies Co.

Rail Braces—(See Braces, Rail).

Rail, Manganese.
Manganese Steel Rail Co.

Rail Reclamation Equipment.
Ryerson & Son, Joseph T.

Railroad Shops.
Arnold Engineering Co., The.
United Engineers & Constructors, Inc.

Railroad Structures — (See Engineers and Contractors; also Buildings).

Rail Splice Plates — (See Joints, Rail).

Rails.
Bethlehem Steel Co.
Hyman-Michaels Co.
Illinois Steel Co.

Rails, Industrial.
Ryerson & Son, Joseph T.

Rails, Relaying.
Hyman-Michaels Co.

Rattan.
Hale-Kilburn Co.

Rectifiers for Signal Works.
Fansteel Products Co., Inc.
Lundy Co., E. A.

Reducing Valves.
Vapor Car Heating Co., Inc.

Reels, Hose.
National Railway Appliance Co.

Reflectors, Headlight.
Electric Service Supplies Co.
Pyle-National Co.
Sunbeam Electric Mfg. Co.

Repair Parts.
Baldwin Locomotive Works.

Replacers, Car.
National Railway Appliance Co.
Q & C Co., The.

Reverse Gears, Power.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Riveting Machines, Portable —(See also Hammers, Pneumatic).

Rivets.
Neely Nut & Bolt Co.
Pressed Steel Car Co.
Ryerson & Son, Joseph T.

Rods.
Neely Nut & Bolt Co.

Rods, Monel Metal Nickel.
International Nickel Co.

Rods, Nickel.
American Mond Nickel Co.

Roller Bearings—(See Bearings, Roller).

Rolls, Bending & Straightening.
Niles-Bement-Pond Co.

Roof Slabs, Concrete.
American Cement Tile Mfg. Co.

Roofing, Asbestos.
Johns-Manville Corp.

Roofing, Buildings.
Johns-Manville Corp.

Roofing, Car.
Hutchins Car Roofing Co.
Johns-Manville Corp.
National Railway Appliance Co.

Roofing, Corrugated.
Johns-Manville Corp.

Roofing, Tile, Cement.
American Cement Tile Mfg Co.

Roofing, Wood.
Industrial Lumber Co.

Rope, Wire—(See Wire Rope)

Rotary Converters.
American Brown Boveri Electric Corp.

Saddles, Running Board
Miner, W. H

Sash, Steel.
Truscon Steel Co.

Saws, High Speed Friction
Ryerson & Son Joseph T

Saws, Portable, Rail
Industrial Brownhoist Corp
Q & C Co., The

Scrapers, Wheeled and Drag
Hale-Kilburn Co
Western Wheeled Scraper Co.

Seats, Car
Hale-Kilburn Co.

Shafting.
Falls Hollow Staybolt Co.
Ryerson & Son, Joseph T.

Shapers.
Niles-Bement-Pond Co.
Ryerson & Son, Joseph T.

Shapes, Pressed Steel.
Pressed Steel Car Co.
Truscon Steel Co.

Shapes, Structural.
Carnegie Steel Co.
Illinois Steel Co.
Ryerson & Son, Joseph T.
Scullin Steel Co.

Sheds, Train.
American Bridge Co.
Arnold Engineering Co., The.

Sheets, Black and Galvanized
Ryerson & Son, Joseph T.

Sheets, Corrugated.
Johns-Manville Corp.

Sheets, Corrugated and Plain
Inland Steel Co.

Sheets, Monel Metal Nickel.
International Nickel Co.

Sheets, Nickel.
American Mond Nickel Co.
International Nickel Co.

Sheets, Steel.
Bethlehem Steel Co.
Ryerson & Son, Joseph T.

Shops, Railroad—(See Buildings, Iron, Steel and Steel Concrete).

Shovels and Draglines.
Industrial Brownhoist Corp.

Siding, Corrugated & Plain.
Johns-Manville Corp.

Signs, Destination.
Electric Service Supplies Co.

Silico Manganese.
Vanadium Corp. of America.

Slag, Blast, Furnace.
Carnegie Steel Co.

Slotting Machines.
Niles-Bement-Pond Co.

Solder.
National Bearing Metals Corp.

Spikes.
Illinois Steel Co.

Splice Bars, Angle.
Carnegie Steel Co.
Illinois Steel Co.

Splice Bars, Rail.
Bethlehem Steel Co.

Spreaders, Ballast.
Jordan Co., O. F.

Springs.
American Steel Foundries.
Fort Pitt Spring & Mfg. Co.
Pittsburgh Spring & Steel Co.
Railway Steel Spring Co.
Standard Steel Works Co.
Union Spring & Mfg. Co.

Springs, Shop Equipment.
Ryerson & Son, Joseph T.

Springs, Vanadium Steel.
National Railway Appliance Co.
Pittsburgh Spring & Steel Co.
Railway Steel Spring Co.

Stacks, Steel.
American Bridge Co.

Stands, Switch and Target.
Q & C Co., The.

Staybolts.
American Locomotive Co.
Bethlehem Steel Co.
Ewald Iron Co.
Falls Hollow Staybolt Co.
Ryerson & Son, Joseph T.

Staybolts, Hollow.
Falls Hollow Staybolt Co.
Ryerson & Son, Joseph T.

Steam Chests.
Franklin Railway Supply Co., Inc.

Steel, Alloy.
Bethlehem Steel Co.
Timken Roller Bearing Co., The.

Steel, Electric Furnace.
Timken Roller Bearing Co., The.

Steel, Firebox.
Bethlehem Steel Co.
Carnegie Steel Co.
Illinois Steel Co.

Steel, Heat Treated.
Bethlehem Steel Co.

Steel, Open Hearth.
Timken Roller Bearing Co., The.

Steel Pressed Specialties.
Hale-Kilburn Co.

Steel, Structural.
American Bridge Co.
American Brown Boveri Electric Corp.
Bethlehem Steel Co.
Carnegie Steel Co.
Illinois Steel Co.
Ryerson & Son, Joseph T.
Scullin Steel Co.
Truscon Steel Co.

Steel, Tool.
Illinois Steel Co.
Ryerson & Son, Joseph T.
Timken Roller Bearing Co., The.

Step Joints.
Q & C Co., The.

Steps, Car—(See Car Steps, Safety).

Stringers, Bridge.
Central Coal & Coke Co.
Century Wood Preserving Co.
Industrial Lumber Co.
Michigan Wood Preserving Co.
New England Wood Preserving Co.
Ohio Wood Preserving Co.
Pittsburgh Wood Preserving Co.

Stringers, Bridge, Creosoted.
Century Wood Preserving Co.
Michigan Wood Preserving Co.
New England Wood Preserving Co.
Ohio Wood Preserving Co.
Pittsburgh Wood Preserving Co.

Superheaters.
Babcock & Wilcox Co.
Superheater Co., The.

Supports, Bottom Rod.
Chicago Railway Equipment Co.

Switch and Switch Stands.
Bethlehem Steel Co.
Ramapo Ajax Corp.
Union Switch & Signal Co.

Switch Boards.
American Brown Boveri Electric Corp.

Switch Boards & Panels.
Johns-Manville Corp.

Switches, Electric.
American Brown Boveri Electric Corp.
Electric Service Supplies Co.

Syphons, Locomotive.
Locomotive Firebox Co.

Tanks, Air, Gas and Oil.
American Locomotive Co.
Babcock & Wilcox Co.
Pressed Steel Car Co.
Westinghouse Air Brake Co.

Tanks, Air, Gas, Oil and Water.
American Bridge Co.
Babcock & Wilcox.
Pressed Steel Car Co.
Westinghouse Air Brake Co.

Tanks, Water.
American Locomotive Co.
Babcock & Wilcox.

Tape, Insulating.
Johns-Manville Corp.
Okonite Co., The.

Tars, Staybolt.
Ryerson & Son, Joseph T.

Terminals, Railroad.
United Engineers & Constructors, Inc.

Testers, Gage.
Ashton Valve Co.

Thermostats.
Gold Car Htg. & Ltg. Co.
Vapor Car Heating Co., Inc.

Ties, Creosoted.
American Bridge Co.
Century Wood Preserving Co.
International Creosoting & Construction Co.
Jennison-Wright Co.
Michigan Wood Preserving Co.
New England Wood Preserving Co.
Ohio Wood Preserving Co.
Pittsburgh Wood Preserving Co.

Ties, Steel.
American Bridge Co.

Ties, Wood.
Century Wood Preserving Co.
Michigan Wood Preserving Co.
New England Wood Preserving Co.
Ohio Wood Preserving Co.
Pittsburgh Wood Preserving Co.
Prettyman & Sons, J. F.

Ties, Zinc Treated.
Century Wood Preserving Co.
Michigan Wood Preserving Co.
New England Wood Preserving Co.
Ohio Wood Preserving Co.
Pittsburgh Wood Preserving Co.

Timber.
Industrial Lumber Co.

Timber, Creosoted.
International Creosoting & Const. Co.
Prettyman & Sons, J. F.

Timber, Railway.
Century Wood Preserving Co.
International Creosoting & Construction Co.
Michigan Wood Preserving Co.
New England Wood Preserving Co.
Ohio Wood Preserving Co.
Pittsburgh Wood Preserving Co.

Timber, Railway, Creosoted.
Century Wood Preserving Co.
Michigan Wood Preserving Co.
New England Wood Preserving Co.
Ohio Wood Preserving Co.
Pittsburgh Wood Preserving Co.

Tires, Steel.
Edgewater Steel Co.
Railway Steel Spring Co.
Standard Steel Works Co.

Tower Floodlights.
Pyle-National Co.

Track Skates.
Q & C Co., The.

Tractors.
Elwell-Parker Electric Co.

Tractors, Industrial.
Elwell-Parker Electric Co.

Tractors, Turntable.
Nichols & Bros., Geo. P.

Transfer Tables.
American Bridge Co.
Industrial Brownhoist Corp
Nichols & Bros., Geo. P.

Transformers.
American Brown Boveri Electric Corp.

Traps, Steam.
Crane Company.
Johns-Manville Corp.

Treads, Safety.
Ryerson & Son, Jos. T.

Treatment, Water—(See Water Softening and Purifying).

Truck Frames—(See Frames, Truck).

Trucks.
Scullin Steel Co.
Symington Co., The.

Trucks, Car and Locomotive.
American Locomotive Co.
American Steel Foundries.
Baldwin Locomotive Works.
Franklin Railway Supply Co., Inc.
Mt. Vernon Car Mfg. Co.
National Railway Appliance Co.
Pressed Steel Car Co.
Scullin Steel Co.
Standard Car Truck Co.

Trucks, Electric Storage Battery.
Elwell-Parker Electric Co.

Trucks, Industrial.
Elwell-Parker Electric Co.

Trucks, Motor.
White Company, The.

Trucks, Trailer.
Franklin Railway Supply Co., Inc.

Tructors, Industrial.
Elwell-Parker Electric Co.

Tubes, Boiler.
Ryerson & Son, Joseph T.

Tubes, Boiler Charcoal Iron.
Bethlehem Steel Co.

Tubes, Nickel.
International Nickel Co.

Tubes, Stay.
Falls Hollow Staybolt Co.

Tubing, Seamless Steel.
Timken Roller Bearing Co., The.

Tungsten Metal.
Vanadium Corp. of America.

Turbines, Steam.
American Brown Boveri Electric Corp.

Turbo Generators.
American Brown Boveri Electric Corp.
Electric Service Supplies Co.
Pyle-National Co.
Sunbeam Electric Mfg. Co.

Turnbuckles.
American Bridge Co.
Ryerson & Son, Joseph T.

Turntable Tractors.
Nichols & Bros., Geo. P.

Turntables.
American Bridge Co.
Bethlehem Steel Co.
Industrial Brownhoist Corp.
Nichols & Bros., Geo. P.

Uncoupling Device.
Hutchins Car Roofing Co.

Underflow Ducts, Fibre and Metal.
Johns-Manville Corp.

Underframes, Steel.
Pressed Steel Car Co.

Upholstery, Car.
Massachusetts Mohair Plush Co.

Valve Gears, Locomotive.
Pyle-National Co.

Valves, Blown & Blow-Off.
Crane Company.

Valves, Brass.
Crane Company.

Valves, Cab.
Crane Company.

Valves, Drifting.
Franklin Railway Supply Co., Inc.
Pilot Packing Co.

Valves, Globe Angle Disc, Gate and Check.
Crane Company.

Valves, Piston.
Franklin Railway Supply Co., Inc.

Valves, Pop, Safety and Relief.
Ashton Valve Co.
Crane Company.
Vapor Car Heating Co., Inc.
Westinghouse Air Brake Co.

Valves, Pressure Regulating.
Gold Car Htg. & Ltg. Co.

Varnishes.
National Railway Appliance Co.

Ventilators.
Electric Service Supplies Co.

Ventilators, Car.
Gold Car Htg. & Ltg. Co.
National Railway Appliance Co.
Vapor Car Heating Co., Inc.

Ventilators, Shop & Roundhouse.
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Pressed Steel Car Co.
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Q & C Co., The.

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Welding Machines, Electric.
National Railway Appliance Co.
Ryerson & Son, Joseph T.

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Ryerson & Son, Joseph T.

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Scullin Steel Co.
Standard Steel Works Co.
Union Steel Casting Co.

Wheels, Car and Locomotive.
American Locomotive Co.
American Steel Foundries.
Baldwin Locomotive Works.
Bethlehem Steel Co.
Carnegie Steel Co.
Edgewater Steel Co.
Illinois Steel Co.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.
Railway Steel Spring Co.
Standard Steel Works Co.

Wheels, Cast Iron, Chilled Tread.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.

Wheels, Hand & Motor Car.
Woolery Machine Co.

Wheels, Mine Car.
Carnegie Steel Co.
Edgewater Steel Co.
Mt. Vernon Car Mfg. Co.

Wheels, Steel and Steel Tired.
American Locomotive Co.
American Steel Foundries.
Carnegie Steel Co.
Edgewater Steel Co.
Illinois Steel Co.
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Wire, Fence.
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Wire, Insulated.
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